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WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

JUNE, 1889.

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PREPARED UNDER THE DIRECTION OF
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1889.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of June, 1889.

Name of vessel.	Captain.
Am. s. s. Adirondack	J. Sansom.
Br. Adriatic	J. G. Cameron.
Advance	D. E. Griffiths.
Aguan	J. C. Adair.
Ailsa	J. W. Morris.
Am. Alamo	S. Risk.
Br. Alaska	G. S. Murray.
Alene	E. J. Seiders.
Am. Algiers	F. W. Mason.
Ger. Aller	H. Christoffers.
Br. Alps	T. McKnight.
Am. Alps	J. Latimer.
Br. Alvena	F. McKay.
Alvo	D. Williams.
Ger. America	R. Heintze.
Dtch. Amsterdam	G. Stenger.
Br. Anchoria	A. Campbell.
Andean	H. Wraxe.
Anerly	W. T. Sherborne.
Arabic	W. M. Smith.
Ardangorm	H. Cameron.
Arizona	S. Brooks.
Athos	H. Low.
Ger. Augusta Victoria	A. Albers.
Br. Aurania	H. McKay.
Nor. Balder	L. Christie.
Br. Baltimore	J. Trenery.
Ger. Baltimore	W. Reimkasten.
Br. Barracouta	R. R. Hubbard.
Barrowmore	H. Moore.
Bavarian	M. Fitt.
Bellaura	J. A. Moppett.
Belg. Belgenland	Rud. Weyer.
Br. Borderer	F. Manley.
Bothnia	J. B. Watt.
Bracadale	J. Notman.
Fr. Britannia	Coste.
Br. Britannic	H. Davison.
British Empire	R. Wills.
British King	John Kelly.
British Prince	S. Nowell.
British Princess	E. H. Freeth.
Brooklyn City	W. Fitt.
Ger. Buenos Ayres	J. Scott.
Br. Buffalo	J. H. Malet.
Bulgarian	R. Leask.
Ger. California	H. Bauer.
Br. Canada	J. Robinson.
Caribbean	H. Daniel.
Carroll	G. H. Brown.
Catalonia	J. J. Atkin.
Span. Cataluna	F. Jaureguirar.
Ger. Catania	H. M. Franck.
Br. Cearense	J. F. Heath.
Celtic	E. J. Smith.
Cephalonia	T. Dutton.
Chancellor	W. Lynas.
Am. Cherokee	H. A. Bearse.
Br. Circassia	J. Harris.
Circassian	R. Barrett.
Am. City of Alexandria	J. McIntosh.
Br. City of Berlin	F. M. Passow.
Am. City of Chester	R. Bond.
Br. City of Chicago	A. Redford.
City of New York	F. E. Land.
Am. City of Para	J. L. Lockwood.
Br. City of Paris	Fred. Watkins.
City of Rome	H. Young.
Am. City of Washington	J. W. Reynolds.
Br. Colina	R. C. Jennings.
Colon	F. Henderson.
Am. Colorado	F. E. Jenkins.
Br. Corean	C. J. Menzies.
Counsellor	W. Lang.
Crown Prince	J. Scrivener.
Crystal	R. B. Stannard.
Denmark	R. S. Rigby.
Derwent	J. Pope.
Devonia	J. Craig.
Durham City	J. A. Jacobsen.
Earnmoor	R. Grey.
Earnwell	C. N. Mumford.
Dtch. Edam	W. Bakker.
Br. Edith Godden	J. H. Bennett.
Egypt	J. Sumner.
Egyptian Monarch	T. M. Irvine.
Ger. Eider	H. Baur.
Elbe	R. Sander.
Am. El Paso	H. S. Quick.
El Monte	R. B. Quick.
Ger. Ems	T. Junget.
Br. England	A. F. Heeley.
It. Entella	V. Bruno.
Br. Erin	W. Tyson.
Ethiopia	J. Wilson.
Etruria	W. H. P. Haines.
Span. Euskaro	S. de Fellerio.
Br. Exeter City	T. L. Weiss.
Am. Excelsior	H. L. Higgins.
Br. Federation	R. Pinkham.
Floridian	S. S. Sandrey.
France	A. D. Hadley.
Ger. Fulda	R. Ringk.
Span. Gaditano	F. Goicoechea.
Br. Galileo	W. Magee.
Span. Gallego	J. B. Arribalsaga.
Br. Gallia	M. Murphy.
Ger. Gellert	C. Kaempff.
Br. Glenfield	J. Newdick.
Ger. Gluckauf	V. Szymanski.
Br. Gothenburg City	J. Harrison.

Name of vessel.	Captain.
Ger. s. s. Graf Bismarck	F. Warnkes.
Br. Grecian	C. E. Le Gallais.
Greece	A. J. Jeffrey.
Ger. Hammonia	H. Vogelgesang.
Br. Haytian	J. Coward.
Dan. Hekla	A. G. Thomsen.
Br. Helvetia	G. Cochrane.
Ger. Hermann	W. Schmolder.
Br. Hindoo	J. Douglas.
Holland	T. Foote.
Ger. Hungarian	Leithausen.
Span. Hugo	A. de Mugica.
Am. Indiana	W. J. Boggs.
It. Iniziativa	A. Consoneri.
Br. Iowa	E. W. Owens.
Istrian	A. W. Ball.
Italy	W. Pearce.
Ixia	W. Churnside.
Kansas	A. Fenton.
Nor. Kong Alp	J. Dahl.
Fr. La Bourgogne	E. Franquel.
La Bretagne	M. de Jousselin.
La Champagne	Boyer.
La Gascogne	Santelli.
Ger. Lahn	H. Hellmers.
Br. Lake Huron	R. Owens.
Lake Nepigon	F. Carey.
Lake Ontario	H. Campbell.
Lake Superior	W. Stewart.
Lake Winnipeg	P. D. Murray.
Am. Lampassas	M. B. Crowell.
Fr. La Normandie	Collier.
Ger. Leipzig	D. Rohlenbeck.
Br. Lero	J. Chisholm.
Llandaff City	T. H. Gore.
Lord Clive	P. Urquhart.
Lord Gough	E. M. Hughes.
Lord O'Neill	A. Ferris.
Am. Lorenzo D. Baker	W. F. Wiley.
Louisiana	E. V. Gager.
Br. Lydian Monarch	T. C. Huggett.
Ger. Main	M. Moller.
Br. Maine	R. Griffiths.
Am. Manhattan	F. Stevens.
Br. Manitoban	W. Dunlop.
Marenhense	T. Pole.
Ger. Marsala	N. Maass.
Br. Martello	W. Abbott.
Mentmore	R. Waite.
Michigan	S. Walters.
Minia	S. Trott.
Minneola	T. L. Evans.
Minnesota	R. J. Blacklin.
Montreal	J. Wall.
Ger. Moravia	Winkler.
Am. Mount Edgcombe	J. Wetherel.
Ger. Munchen	A. Jæger.
Br. Muriel	G. S. Locke.
Span. Navarro	S. de Aldecocea.
Belg. Nederland	E. Bence.
Br. Nessmore	G. Elliott.
Nestorian	J. France.
Nevada	J. A. R. Cushing.
Newnham	J. J. Johnston.
Am. Newport	C. C. Lima.
New Orleans	T. P. C. Halsey.
Belg. Noordland	H. E. Nickels.
Br. Norseman	R. Williams.
Nova Scotian	R. H. Hughes.
Dtch. Obdam	G. Bakker.
Br. Oceanic	J. Metcalf.
Ocean Prince	W. J. Milburn.
Am. Ohio	R. W. Sargent.
Br. Ohio	H. Winter.
Ontario	W. P. Couch.
Oranmore	B. Jones.
Oregon	H. C. Williams.
Orinoco	J. S. Garvin.
Parisian	J. Ritchie.
Pavonia	A. McKay.
Dtch. P. Caland	G. Lutz.
Br. Peconic	G. Evans.
Belg. Pennland	C. H. Grant.
Br. Peruvian	J. M. Wallace.
Petriana	S. W. Ryder.
Ger. Polynesia	G. Franck.
Br. Pomona	J. Legoe.
Am. Portia	F. Ash.
Br. Prussian	J. Ambury.
Ger. Rhaetia	E. Kopff.
Rhein	W. Kuhlmann.
Belg. Rhynland	A. J. Griffin.
Br. Richmond Hill	H. H. Perry.
Robinia	T. H. Smith.
Roman	E. Maddox.
Rosse	Thos. Hening.
Dtch. Rotterdam	H. C. v. d. Zee.
Br. Roxburgh Castle	W. Swartman.
Ger. Rugia	R. Karlowa.
Saale	B. Blanke.
Br. Saint Asaph	C. H. Hossock.
Saint Ronans	H. Campbell.
Samaria	T. Hewitson.
Santiago	Potter.
Sardinian	W. Richardson.
Sarnia	J. Gibson.
Scandinavian	J. Park.
Scythia	T. Roberts.
Am. Seneca	F. Stevens.
Br. Servia	H. Walker.
Siberian	R. P. Moore.

Name of vessel.	Captain.
Nor. s. s. Sif	H. Bentzon.
Ger. Slavonia	H. Schmidt.
Br. Sorrento	F. W. Ouston.
Spain	W. A. Griffiths.
State of Georgia	G. Moodie.
State of Indiana	A. Ritchie.
State of Nebraska	A. G. Braes.
State of Nevada	J. A. Stewart.
State of Pennsylvania	A. J. A. Mann.
State of Texas	G. Williams.
Stockholm City	W. Thompson.
Strabo	A. Matheson.
Ger. Suevia	C. Ludwig.
Belg. Switzerland	J. Ueberweg.
Ger. Taormina	G. W. Koch.
Br. Thanemore	C. W. Simpson.
The Queen	T. P. Heeley.
Dan. Thingvalla	S. T. H. Laub.
Span. Tomas Brookes	E. F. Canal.
Br. Toronto	J. MacAuley.
Tower Hill	R. Bennett.
Ger. Trave	W. Willigerod.
Br. Trinacria	G. Mitchell.
Ulunda	T. Clark.
Umbria	W. McMickan.
Vancouver	C. J. Lindall.
Dtch. Veendam	A. Potjer.
Br. Venetian	E. Parry.
Venice	A. B. Bolt.
Nor. Viking	S. H. Frus.
Fr. Ville de St. Nazaire	Danjon.
Br. Virginian	W. C. Fry.
Belg. Waesland	H. Buschmann.
Br. Waldensian	A. Whyite.
Ger. Werra	R. Bussius.
Belg. Westernland	J. C. Jamison.
Ger. Wieland	H. Barends.
Br. William Cliff	E. Winder.
William Coulman	W. Scott.
Wisconsin	J. P. Worral.
Wyoming	C. L. Rigby.
United States Naval.	
U. S. C. S. A. D. Bache	J. F. Moser.
U. S. S. Constellation	P. F. Harrington.
U. S. S. Despatch	W. S. Cowles.
U. S. S. Galena	G. W. Sumner.
U. S. C. S. G. S. Blake	J. E. Pillsbury.
U. S. S. Minnesota	G. C. Wiltse.
U. S. S. New Hampshire	J. F. Higginson.
U. S. S. Quinnebaug	C. H. Davis.
U. S. S. Ranger	F. A. Cook.
Sailing vessels.	
Am. bg. Abbe Clifford	D. W. Storer.
bk. Ada P. Gould	W. B. Henrahan.
schr. Addie Jordan	W. H. Harriman.
It. bk. Adele	M. Astarita.
Ger. Auguste	H. Schumacher.
Br. schr. Alberta	G. S. Francis.
Am. Albert L. Butler	W. Foster.
Anna E. Kranz	W. H. Pervere.
bg. Arcot	J. W. Cates.
Ger. bk. Charlotte and Anna	J. Moncrieff.
Br. sp. Charles S. Whitney	G. D. Spicer.
It. bk. Clementina	G. Parzio.
Am. Clotilde	I. W. Bowden.
schr. Comet	W. H. Aldrich.
bg. Daisy Boynton	C. Harding.
schr. Elbridge Souther	J. T. Fales.
Ger. bk. Farewell	C. H. Klein
Am. schr. Florence Randall	J. L. Randall.
sp. Francis	A. Doane.
Aust. bk. Francesca T	M. P. Martinolich.
Am. yacht Gitana	E. Sherlock.
bk. Glad Tidings	R. Roberts.
Br. bgt. Hattie Louise	W. H. Barnard.
Am. bk. Havana	B. F. Rice.
bg. H. B. Hussey	G. W. Hodgdon.
schr. Henry A. Faber	H. E. Garlick.
bkt. Henry Warner	J. T. Paine.
Br. bk. Iodine	Adam Smith.
Am. Itonus	Bucknam.
Br. sp. J. J. Smith	J. B. Tingley.
Am. schr. John R. Bergen	W. H. Squires.
bk. John R. Stanhope	J. B. Norton.
bkt. Jose E. More	A. Leonhard.
pilot Joseph F. Loubat	J. McCarthy.
schr. Joshua Baker	J. Kelley.
Port. bk. Julius	F. D. Vieira.
Am. sp. Light vessel No. 45	Andrew Jackson.
Louis Walsh	T. C. Pendleton.
Br. Lucania	R. Gibson.
Aust. bk. Mattea	G. Vidulich.
Am. schr. Maud H. Dudley	A. L. Cummings.
May O'Neill	J. E. Creighton.
bk. Megunticook	E. E. Wallace.
Br. Minden	R. MacDonald.
Am. tern. Nantasket	E. A. Richardson.
schr. Otello	M. J. Bond.
sp. Panay	L. R. Bray.
Ger. bk. Polly Scott	F. Harder.
Nor. Prince Eugene	C. Nygaard.
Regia	T. Dutts.
Am. bg. Robert Mowe	W. Peterson.
bk. Sarah	L. R. Hale.
Dtch. Senator Iken	J. Hohnholtz.
Am. schr. Talofa	R. E. Fletcher.
Thomas P. Ball	H. B. Ryder.
Br. bk. William Cochrane	H. W. Dernier.
Am. schr. Wm. F. Green.	W. E. Crockett.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVII. WASHINGTON CITY, JUNE, 1889. No. 6.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for June, 1889, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of ten areas of low pressure are shown; the average number traced for June during the last fifteen years being 9.2. This chart also exhibits the paths of the centres of five depressions traced over the north Atlantic Ocean; the limits of fog-belts west of the fortieth meridian, and the distribution of icebergs and field ice during the month. The areas of high and low pressure and north Atlantic storms are discussed under their respective headings.

Chart ii exhibits the distribution of mean atmospheric pressure and temperature for the month. The mean temperature was below the normal over a greater part of the interior and southern parts of the country; and at a large number of stations in the south Atlantic and east Gulf states, and in the Ohio and upper Mississippi valleys the lowest absolute temperature noted during the periods of observation was reported. At several stations, with short records, on the Pacific coast north of the fortieth parallel, the maximum temperature was higher than previously recorded for June.

Chart iii shows the distribution of precipitation for June, 1889. More than the average amount of precipitation for the month fell from New England and the lower lakes southward to the Gulf of Mexico, and thence westward to the Rio Grande Valley and the middle-eastern slope of the Rocky Mountains; elsewhere the precipitation was deficient, and from Minnesota westward to the Pacific coast, and over the middle plateau region, averaged less than one-half the usual amount for June. The greatest excess occurred in the south Atlantic states, where the rainfall exceeded the June average by about 50 per cent.

The destructive floods at the beginning of the month in sections of the Middle States are discussed in this and the preceding issue of the REVIEW.

Under the heading "Drought" are given extracts from reports of observers in Dakota, Montana, and Idaho relative to the damaging drought that prevailed in those territories.

In the preparation of this REVIEW data from 2,226 stations have been used, classified as follows: 175 Signal Service stations; 124 monthly registers from United States Army post surgeons; 1,412 monthly registers from state weather service and voluntary observers; 22 Canadian stations; 164 stations through the Central Pacific Railway Company; 329 marine reports through the co-operation of the Hydrographic Office, United States Navy; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa (Weather Crop Bulletin Service), Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for June, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for June, 1888, obtained from observations taken twice daily at the hours named and that determined from hourly observations varied at the stations named below is as follows: At Washington, D. C., New York, N. Y., and Boston, Mass., the mean of the 8 a. m. and 8 p. m. observations was higher by .005, .006, and .012, respectively, while at Saint Louis, Mo., Chicago, Ill., and San Francisco, Cal., the mean of the observations taken at these hours was .001, .002, and .014, respectively, lower than the true mean pressure.

The mean pressure for June, 1889, was highest on the North Carolina coast, where it rose to 30.11 at Hatteras. From the southern New England coast southwestward to the eastern Gulf coast and along the coast of Washington Territory the mean readings rose to or above 30.05. The mean pressure was lowest within an area extending from the lower valley of the Colorado River west of north over southeastern California, where it fell to 29.76 and 29.75 at Yuma, Ariz., and Keeler, Cal., respectively. From this region a trough of low mean pressure extended east of north over the plateau and Rocky Mountain regions to the Canadian Northwest Territories within which the values varied from 29.80 to 29.90. The mean readings were below 29.90 in the lower Saint Lawrence valley, and fell below 29.95 north of the forty-fifth parallel except on the Pacific coast, and in the Rocky Mountain and plateau regions save over a portion of the middle eastern slope.

Compared with the pressure chart for May, 1889, an increase in pressure is shown, except in the Gulf states, the upper Missouri valley, over portions of the middle and southern plateau regions, and on the middle and south Pacific coast. The most marked increase in pressure has occurred on the North Carolina coast, where it amounts to .10, and the greatest decrease, about .10, in the San Joaquin Valley, California. In May, 1889, no well-defined area of high pressure was shown and the mean pressure was highest along the east Gulf coast and over Florida. In the current month the isobar of 30.10, traced on the North Carolina coast, and the isobar of 30.05, traced on the coast of Washington Territory, indicate the regions of highest pressure over the eastern and western portions of the country. From the Colorado Valley northward to the British Possessions north of Montana and Dakota there has been a slight decrease in pressure within the trough of low mean barometer which covered that region.

Compared with the normal pressure for May the mean pressure was above the normal except along the west Gulf coast, in the Rio Grande Valley, eastern Wisconsin, Manitoba, and from the valley of the Columbia River southward along the Pacific coast. The greatest departures above the normal occurred at stations on the New England and south Atlantic coasts, and within an area extending from northern Texas northwestward over Colorado, where they were more than .05. In sections where the mean pressure was below the normal the departures were small, except on the middle Pacific coast, where they were more than .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are given in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In June, 1889, the ranges were greatest over eastern and northern New England, where they were more than .90, and least over southern Florida, southern Arizona, and along the California coast, where they were less than .30. In this month the barometric ranges uniformly increased with the latitude (except in the central valleys, where they were greatest in the lower Missouri valley, whence they decreased slightly northward,) and decreased with a fair degree of regularity with increasing longitude. Along the Atlantic coast the ranges varied from .22 at Key West, Fla., to .93 at Manchester, N. H., Portland and Eastport, Me.; between the eighty-second and ninety-second meridians, .34 at Mobile, Ala., to .84 at Alpena, Mich.; between the Mississippi River and the Rocky Mountains, .31 at Galveston, Tex., to .85 at Leavenworth, Kans.; in the plateau and Rocky Mountain regions, .24 at Whipple Barracks (Prescott), Ariz., to .72 at Fort Custer, Mont.; on the Pacific coast, .21 at San Diego and Los Angeles, Cal., to .65 at Fort Canby, Wash.

AREAS OF HIGH PRESSURE.

Six well-marked areas of high pressure appeared within or near the limits of stations of observation during the month of June, three of which crossed the continent from or near the north Pacific coast to the Atlantic coast, moving southeasterly while the centre remained west of the Mississippi, and afterwards almost directly towards the eastward. Two originated over the Pacific to the west of California and moved northward along the coast to near the fiftieth parallel; of these, one remained central on the Pacific coast at the close of the month, while the other crossed the Rocky Mountains and was traced eastward to the south Atlantic coast. One area appeared north of Montana and disappeared after moving southward to Minnesota. This was followed two days later by an area of high pressure which appeared north of the Lake region, apparently moving eastward, and it disappeared to the east of Nova Scotia.

The following table exhibits in a concise manner some of the more prominent characteristics of the high areas:

No.	First observed.			Last observed.		Duration.	Velocity per hr.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	Days.	Miles.			Inches.
I	1	50	119	32	75	8.0	18	10	Hatteras, N.C.	30.28
II	8	52	115	33	74	8.0	31*	10	Cheyenne, Wyo.	30.38
III	13	52	117	45	96	2.0	25	14	Assiniboine, Mont.	30.26
IV	17	49	85	44	59	2.0	31	19	Halifax, N.S.	30.16
V	15	40	128	40	87	11.5	15	24	Toronto, Ont.	30.50
VI	28	40	127	47	126	2.5	12†	30	Fort Canby, Wash.	30.24
Mean.						5.7	22.0			30.30

*This area moved 31 miles per hour while passing over the continent, but it remained stationary several days near the south Atlantic coast. †Northerly movement.

I.—On the first of the month the pressure was high over Oregon, while areas of low pressure covered the region north of Dakota, the southern plateau and southern Rocky Mountain regions, and a storm of considerable energy, attended by heavy rains, prevailed over the Lake region and middle Atlantic states. The area of high pressure moved slowly to the southeastward to the central Rocky Mountain regions between the 1st and the 4th, the pressure decreasing at the centre, but the flow of air from the north was sufficient to replace the slight depression which existed over Texas on the 3d. It apparently passed eastward over the southern portion of the continent, reaching the south Atlantic states on the 7th, attended by a slight increase of pressure. It was most marked as central off the south Atlantic coast on the 8th, where it remained until re-enforced by the succeeding area of high pressure.

II.—Was first observed in the region northwest of Montana on the 8th, and passed southeastward, following the same general course as that described for high area number i, although its movement was more rapid and it was more clearly defined during its transit over the Mississippi Valley. It passed over the Rocky Mountain regions on the 10th, attended by killing frosts, and over the Mississippi Valley on the 11th, apparently uniting with the area of high pressure which had remained almost stationary off the south Atlantic coast from the 8th to the 12th. This general distribution of pressure continued until the 17th, the high areas covering the greater portions of the country east of the Mississippi. During the 17th the pressure on the Atlantic coast declined rapidly owing to the advance of a tropical storm from the east Gulf which followed the general course of the Gulf stream.

III.—This area was first observed in the same locality as that described for areas numbers i and ii. When it appeared on the 13th an extended area of low pressure covered the greater portion of the plateau and Rocky Mountain regions. It moved southward over Montana, where it was central on the 14th, dividing the area of low pressure previously referred to, apparently forcing a minor disturbance to the eastward over the Lake region, while the principal area of low pressure was driven to the westward over the plateau region. The pressure attending this area of high pressure decreased as the centre approached the upper Mississippi valley, where it was last traced as a separate area.

IV.—Appeared north of the upper lake region on the 17th, following closely to the westward a disturbance which passed over the Maritime Provinces on the 16th. It moved directly eastward during the 17th and 18th north of, and slightly in advance of, a tropical storm traced as number vii on chart number i.

V.—Reports from the Pacific coast on the 15th indicated the advance of an area of high pressure from the Pacific. The succeeding reports from the 15th to the 20th exhibited a general movement of this area of high pressure to the northeastward, attended by a general increase of pressure over the northern plateau and Rocky Mountain regions, the pressure remaining below the normal to the southward. During the 20th the direction of movement changed to the southeast, and by the morning of the 21st this area covered the entire region from the Rocky Mountains eastward to the Lake region, the centre being in western Kansas. It passed directly eastward, attended by increasing pressure as it approached the coast, and extending from the Gulf northward to British America. It passed off the coast on the 25th, but reports indicate that it moved slowly and that it had a controlling influence on the weather in the Atlantic coast districts until the close of the month, the barometer continuing above the normal from Nova Scotia southward to Georgia.

VI.—Appeared on the Pacific coast on the 28th, and apparently moved northward to Washington Territory, where it was central at the close of the month. The 8 p. m. telegraphic report of the 30th exhibited two well-marked areas of high pressure, one apparently central northeast of New England and extending over the eastern half of the continent, while the other covered the Pacific coast, and an extended trough of

low pressure covered the Rocky Mountain regions, the barometer being unusually low in Montana.

AREAS OF LOW PRESSURE.

Ten well-defined areas of low pressure were observed during the month of June, only one of which passed over the Atlantic within the limits of the coast of the United States, and none of which were traced over the continent south of the thirty-eighth parallel of latitude. These disturbances generally had their origin or were first observed in the regions north of Montana. While no area of low pressure has been traced directly from the Pacific coast, three disturbances were first observed in the Rocky Mountain regions attended by conditions which indicated that they had their origin over the plateau regions or further to the westward. The general course of the low areas observed was to the eastward, while west of the Mississippi, and afterwards to the north of east. An examination of chart number i will show that the centre of no disturbance passed over the continent between the lower lake region and the Gulf coast.

The following table exhibits the principal parts regarding these low areas:

No.	First observed.			Last observed.		Duration.	Velocity per h'r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	*Days.*	*Miles.*			*Inches.*
I	2	42	90	48	64	2.5	25.0	5	Chatham, N. B	29.48
II	5	42	73	49	67	2.0	13.5	6	Eastport, Me	29.42
III	4	51	112	45	80	5.0	20.0	4	Calgarry, N. W. T	29.24
IV	10	52	110	50	60	3.0	33.0	10	Medicine Hat, N. W. T.	29.50
V	12	46	114	49	65	3.0	36.0	13	Fort Sully, Dak	29.68
VI	16	52	114	47	57	5.0	27.0	20	Anticosti, Gulf of St. L.	29.34
VII	15	20	85	37	74	4.0	20.0	18	Near Charleston, S. C	29.53
VIII	19	38	105	50	60	3.5	32.0	21	Quebec, Quebec	29.56
IX	25	52	118	54	102	3.0	15.0	28	Qu'Appelle, N. W. T	29.26
X	29	54	114	52	107	1.5	7.0	31	Medicine Hat, N. W. T.	29.40
Means						3.2	23.4			29.44

I and II.—The storm which extended over the eastern portion of the United States on the 1st of the month has been traced on the charts accompanying the previous REVIEW. This storm remained central north of the Lake region until the 2d, attended by a secondary disturbance which moved northeastward over the middle Atlantic states to New England where it disappeared. The principal disturbance was followed by the low area traced as number i which was first observed as central in southern Wisconsin on the afternoon of the 2d. It passed northeastward over the upper lake region, attended by slight energy, and becoming more extended during its easterly movement. On the morning of the 4th it was central north of Lake Huron, but the bounding isobars indicated minor disturbances to the southeastward over New England and the middle Atlantic states. On the afternoon of the 4th the centre had advanced to northern New England, and during the following night a northeasterly movement was observed, both of the principal disturbance and the minor depressure which developed in southern New England and which has been traced as low area number ii. Number i disappeared to the northeast during the 5th, while number ii moved northeastward during the 5th and 6th and disappeared to the north of the Maritime stations on the 7th.

No. III.—This area of low pressure was observed north of Montana on the 4th and moved directly eastward during the 5th and 6th, the attending trough of low pressure extending southward over the eastern slope of the Rocky Mountains, while the principal disturbance apparently remained north of Minnesota. During the 6th the minor disturbance developed over Minnesota, while there are indications of other disturbances to the southwestward. The morning report of the 7th exhibited two well-marked areas of low pressure, one to the north of Lake Superior and the other central in the Missouri Valley. The latter moved southward during the 7th to southern Kansas, after which its course changed to the northeast and it passed rapidly over the Lake region as a well-marked area of low pressure, the barometric pressure increasing, however, during the easterly movement, the storm attaining its maximum energy during its passage over the central Mississippi valley and Lake Michigan. The increasing pressure at the centre was so rapid as to make it impossible to trace this storm to the east of the Lake region, and the indications are that it did not reach the coast.

IV.—This storm also originated within the region north of Montana. It was a minor disturbance which was first observed on the 10th, and it was at no time central within the limits of the United States; its movements eastward, however, have been traced from the regular telegraphic reports from the 10th to the 13th, on which last date it was passing eastward over the Maritime Provinces. In tracing this storm the location of the centre at each of the telegraphic reports could be given only approximately owing to the high latitude of its course.

V.—This disturbance was observed in Idaho on the 12th, and was apparently forced to the southeastward by the advance of an area of high pressure from the north, which, as previously stated, divided this low area and forced the eastern secondary disturbance to the eastward over the Lake region during the 13th and 14th. Although the movements of this disturbance can be clearly traced from the telegraphic reports, it was attended by no marked change in the weather conditions, owing to its slight barometric gradient and the increasing pressure during its easterly movement while passing over the Lake region. After the centre reached the lower Saint Lawrence valley the wind shifted to westerly in New England and on the middle Atlantic coast, attended by local storms, the wind reaching a maximum velocity of thirty-four miles at Block Island.

VI.—This storm appeared north of Montana on the 15th, and apparently approached that region from the north. It moved eastward and developed energy north of the stations of observation during the 16th, 17th, and 18th, when it was central north of Manitoba. During this movement to the eastward a secondary depression developed in the southern portion of the barometric trough which extended over the Rocky Mountain regions. This minor disturbance moved rapidly eastward, covering the northern and eastern slope of the Rocky Mountains on the 18th, attended by severe local storms, and apparently united with the principal depression to the north of Lake Superior on the 19th. After the union of these disturbances, the principal disturbance moved eastward, crossing the lower Saint Lawrence valley as a storm of considerable energy on the 20th. The minimum pressure observed within this disturbance occurred at Anticosti, Gulf of Saint Lawrence, on the evening of the 20th, when the barometer fell to 29.34. Brisk to high westerly winds continued over the Gulf of Saint Lawrence on the 21st, during which date this storm apparently disappeared to the northeast.

VII.—This is the only well-marked tropical storm observed during the month; while the reports from land stations do not indicate the existence of this storm before the 17th, the marine reports show that a storm was central in the east Gulf, to the west of Cuba, on the 15th and 16th. By the morning of the 17th it had reached the west Florida coast, attended by heavy rains and high easterly winds. It passed to the northeast over northern Florida during the 17th, causing a maximum wind of forty-three miles per hour at Cedar Keys, and a wind of thirty-four miles per hour at Jupiter. It continued its northeast course during the 18th along the south Atlantic coast, attended by severe gales, the wind at Charleston reaching thirty-four miles from the east. On the 19th it was apparently central to the east of the middle Atlantic coast, causing a wind of thirty-six miles from the east to northeast at Block Island. During the 19th it continued its northeasterly course, and it is probable that it united with low area number vi after that disturbance reached the lower Saint Lawrence valley.

VIII.—Developed over Colorado during the 19th, the pressure being low during the previous day over the central plateau

region. This disturbance was a limited area and moved rapidly eastward over the Missouri and central Mississippi valleys, attended by light rains. It declined to the northeast after passing over the Lake region, the pressure decreasing at the centre, the disturbance becoming much more extended as it approached the Saint Lawrence Valley. It continued its northeasterly course during the 22d and 23d, followed by an area of high pressure which caused rapid increase in the barometric gradient in the southwest quadrant, and this was attended by strong southwesterly gales in the Saint Lawrence Valley.

IX and X.—These disturbances appeared in the region north of Montana, the former on the 25th and the latter on the 29th. Neither of these storms caused any marked change in the weather conditions in the regions east of the Mississippi during the month. Previous to the development of the storm traced as number ix, a disturbance appeared in the same locality on the 22d. The barometer fell to 29.12 at Swift Current, N. W. T., on the afternoon of the 22d, and at that date the indications were that the most severe storm of the month was slowly advancing eastward from the region north of Montana. A change in the direction of movement, however, carried this disturbance to the northeast before reaching Manitoba, and the centre of the disturbance could be only approximately located at three regular telegraphic reports, and it has therefore not been traced as an area of low pressure on chart i.

NORTH ATLANTIC STORMS FOR JUNE, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during June, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Five depressions have been traced for June, 1889; the average number traced for the corresponding month of the last six years being eight. Of the depressions traced for the current month, three were continuations of areas of low pressure which first appeared over the North American continent; one prevailed west of the British Isles during the earlier days of the month; and one first appeared north of the Bahamas. The West Indian hurricane which advanced northward from the Caribbean Sea during the second decade of the month is described as low area vii. Along the trans-Atlantic steamship tracks west of the Banks of Newfoundland unsettled weather, with moderate to fresh gales, prevailed from the 4th to 7th, 13th, 14th, 17th, and 20th to 23d, attending the passage of depressions to the northward. From the 15th to 19th a depression of moderate strength moved northward from the west portion of the Caribbean Sea over the eastern part of the Gulf of Mexico and thence northeastward off the coast of the United States, attended by fresh gales, save on the 18th, when central off the south Atlantic coast, when strong gales were reported. During the 24th and 25th fresh gales prevailed off the south Atlantic coast with the passage of a depression which apparently advanced from the north of the Bahamas and dissipated over the south Atlantic states. Over mid-ocean the month was characterized by low barometric pressure north of the trans-Atlantic steamship routes during a greater portion of the second and third decades, while south of the forty-fifth parallel the pressure continued generally high. These conditions occasioned fresh westerly winds along the steamship routes during the periods referred to. Over the eastern part of the ocean fair weather prevailed, except during a portion of the first decade. From the 1st to 4th a depression of considerable strength, with pressure falling to about 29.00 (736), was central west of the British Isles, attended by fresh to strong gales, which increased in force to whole gales on the 4th. From the 8th to 10th fresh north to west gales were reported south and east of the British Isles, attending the presence of a depression to the eastward.

The general character of the weather over the western part of the Caribbean Sea is indicated by the following report of Capt. Geo. S. Locke, commanding the steamship "Muriel": "The weather during June, 1889, in the Caribbean Sea, and particularly at the Windward Islands, has been unusually stormy, with extraordinary rainfall. On the Island of Dominica, on 'Shawford Estate,' the rainfall was 28.54 inches for eight consecutive days, with frequent squalls of hurricane violence. The total rainfall on the Island of Dominica for the month was 44.36 inches, and many of the other islands were not short of that amount. Much damage was done to plantations, roads, and bridges, owing to the swollen rivers and mountain streams. The trade winds during the month have been very strong, blowing from east to east-northeast, and attended with violent rain squalls and rough sea."

Compared with the corresponding month of previous years the storms of the north Atlantic were deficient in number and energy. The storms traced for June in preceding years have varied in number from three, in 1883, to fourteen, in 1886. Severe storms are unusual in the middle latitudes of the north Atlantic during this month, and those of tropical or subtropical origin seldom acquire destructive strength. Among notable storms for June may be mentioned those of the first decade of that month in 1885, one of which advanced eastward over Nova Scotia and Cape Breton Island during the 1st and 2d, causing considerable damage to shipping and other property. The other passed eastward from the New Jersey coast during the 5th, and thence eastward to the Grand Banks by the 7th. This storm was especially severe along the Newfoundland coast, and was considered the most disastrous that had visited the island in forty years. It was estimated that more than fifty vessels were totally wrecked, while a large number were driven ashore and seriously damaged.

The following are brief descriptions of the depressions traced for June, 1889:

1.—This depression was central in about N. 56°, W. 24°, on the 1st, with central pressure about 29.00 (736), and fresh and strong north to west gales to the fortieth meridian. By noon, Greenwich time, of the 2d the depression had apparently changed its position but slightly. By the 3d it had moved southward to about N. 51°, W. 20°, from which position it recurved northward to the fifty-sixth parallel by the 4th, after which it disappeared beyond the region of observation. This depression showed the lowest barometric pressure, and occasioned the strongest gales of the month.

2.—This depression was a continuation of low area iv, and passed eastward from the Gulf of Saint Lawrence over Newfoundland during the 14th, and thence northeastward over the ocean by the 15th, after which it passed north of the region of observation. This storm possessed moderate strength during its passage over Newfoundland, but apparently increased in energy after the 14th.

3.—This depression advanced rapidly northeastward over the Gulf of Saint Lawrence and Newfoundland during the 17th, with pressure below 29.70 (754), and on the morning of the 18th was central in about N. 55°, W. 45°, after which it disappeared north of the region of observation with an apparent increase in energy.

4.—This depression was a continuation of low area vi, and advanced eastward over the Gulf of Saint Lawrence during the 20th, with pressure below 29.40 (747), and fresh gales along the American coast. On the morning of the 21st the depression was central north of Newfoundland, attended by fresh to strong gales over the Grand Banks; by the following

date the centre of disturbance had advanced over mid-ocean to about latitude N. 54°, and at noon, Greenwich time, of the 23d it was central in about N. 57°, W. 28′, after which it passed north of the region of observation.

5.—The presence of a disturbance off the south Atlantic coast north of the Bahamas was shown by reports of the 24th, and reports from land stations indicate that the disturbance moved northwestward over the south Atlantic coast and dissipated. This depression was feeble, and its presence and passage were shown by wind directions and moderate to fresh gales in the region it traversed.

FOG IN JUNE.

The following are limits of fog-areas on the north Atlantic Ocean during June, 1889, as reported by shipmasters:

Date.	Entered.		Cleared.		Date.	Entered.		Cleared.	
	Lat. N.	Lon. W.	Lat. N.	Lon. W.		Lat. N.	Lon. W.	Lat. N.	Lon. W.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
1	41 43	66 05	41 37	66 32	14	49 59	43 14	49 31	44 27
2	42 08	55 48	42 23	54 02	15-16	47 25	59 10	48 48	63 20
2-3	43 48	56 05	43 08	60 00	15-16	42 29	63 40	140 miles east of Boston Light.	
3	49 10	47 20	6 miles off Saint John's, N. F.		15-16	44 05	63 02	Halifax.	
3	47 09	40 34	46 29	42 00	16-17	43 40	49 10	45 10	45 00
5-6	43 24	51 44	42 55	54 30	16-17	43 00	63 00	42 38	68 00
6-7	44 23	46 18	42 45	51 30	16-17	44 24	56 24	43 21	59 20
7-8	42 30	52 00	43 36	47 24	16-17	41 40	61 40	40 31	69 20
8	42 28	48 20	42 11	47 45	17-18	43 02	57 15	42 56	59 53
8-9	44 40	46 30	43 12	50 30	17-18	44 46	45 57	43 16	49 33
9	43 00	48 18	42 36	49 56	19-20	40 56	67 10	40 30	70 40
9-10	46 40	58 00	49 00	65 00	19-20	40 44	69 31	42 12	69 55
10	Delaware Light-Ship.		Off Long Branch.		19-20	Halifax.			
10	52 48	51 43	52 22	53 20	19-20	40 15	70 30	40 13	68 00
10-11	43 29	49 23	45 10	44 08	20	40 32	66 43	40 29	70 00
11	41 30	65 48	40 28	69 44	20	38 50	74 35	38 35	74 32
11	52 00	52 00	51 00	52 00	20-21	46 45	51 41	46 00	53 10
11-12	41 03	66 10	40 41	70 04	21-22	40 58	68 54	40 34	72 08
11-12	42 41	63 00	42 30	68 45	22	43 11	51 53	42 49	54 31
11-12	40 45	66 30	40 27	68 46	22	40 52	65 35	40 40	69 37
11-12	Canso Roads.		44 45	61 31	22-23	44 05	43 16	43 55	50 45
12-13	42 38	50 43	44 08	45 51	22-23	Off Sambro Island.		44 04	63 02
12-13	40 43	66 30	40 34	70 12	23	41 36	50 08	41 32	50 29
12-13	48 18	43 38	45 31	50 16	26	40 30	69 03	40 29	70 15
12-14	47 40	43 00	44 55	50 00	26	41 35	69 05	Off Cape Cod.	
12-14	49 18	43 15	46 30	53 10	27	42 24	56 00	42 25	54 30
13	42 40	64 45	42 40	63 30	27-29	47 44	49 42	48 03	61 25
13-14	44 19	44 24	42 30	51 16	28-30	42 05	65 40	42 56	*67 04
13-14	50 17	43 58	48 20	48 32	29	42 18	65 34	Off Cape Cod.	
					29	40 40	68 09	40 27	72 47

*Fog continued to close of month.

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on nineteen dates, as compared with fifteen dates for May, 1889, and twenty-three dates for June, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on eighteen dates, as compared with fifteen dates for May, 1889, and twelve dates for June, 1888. West of the sixty-fifth meridian fog was reported on fifteen dates, as compared with twenty dates for May, 1889, and eighteen dates for June, 1888. Compared with the preceding month there has been an increase in fog frequency over or near the Grand Banks and to the southward of Nova Scotia, while to the westward of the sixty-fifth meridian fog was less frequently encountered than during the preceding month. East of the fifty-fifth meridian fog was generally reported with the presence or passage of areas of low pressure over New England, the Canadian Maritime Provinces, or the Gulf of Saint Lawrence. On a number of dates, however, fog developed with southerly winds attending low barometric pressure to the northward of Newfoundland and the Grand Banks. In the vicinity, and to the southward, of Nova Scotia fog was generally reported with the approach or passage of areas of low pressure to the northward. On several dates it was encountered in that region with southerly winds and low barometric pressure to the north of the Gulf of Saint Lawrence. Off the coast of the United States fog was reported on six dates with areas of low pressure central near or off the coasts of the United States or Nova Scotia, or over the Gulf of Saint Lawrence, and on nine dates with high barometer, south to east winds, and unsettled weather.

OCEAN ICE IN JUNE.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for June during the last seven years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
June, 1883	40 28	51 45	June, 1883	48 14	42 43
June, 1884	40 42	47 49	June, 1884	44 00	45 23
June, 1885	39 38	48 12	June, 1885	45 14	41 12
June, 1886	40 30	53 00	June, 1886	49 15	40 00
June, 1887	40 40	48 34	June, 1887	43 22	39 19
June, 1888	43 38	43 24	June, 1888	43 38	43 24
June, 1889	42 54	49 54	June, 1889	46 57	40 29

In June, 1889, the southernmost ice reported was about two degrees north of the average southern limit, and the easternmost ice noted was about one and one-half degrees east of the average eastern limit of ice for the month. Ice was most frequently encountered along the east and north edge of the Banks of Newfoundland, and from Belle Isle eastward to the fifty-first meridian. Reports have been received from several steamships that effected the passage of Belle Isle Straits; this route being closed to navigation by ice during the preceding months of the year. Compared with the corresponding month of preceding years the aggregate quantity of Arctic ice reported for June, 1889, corresponded closely with the average for the month. Compared with May, 1889, the southern limit for the current month was about one degree farther south, while the extreme eastern limit was about four degrees farther west.

The following positions of icebergs and field ice reported are shown on chart i by ruled shading:

1st.—N. 47° 00′, W. 46° 11′ to N. 46° 40′, W. 47° 00°, two bergs and one piece of ice; N. 48° 26′, W. 48° 55′, several large bergs and field ice.

2d.—N. 48° 04′, W. 48° 20′, four small and one medium bergs; N. 46° 45′, W. 41° 14′, a large berg about 400 to 500 feet long and 150 feet high; N. 46° 30′, W. 42° 00′, a large berg; N. 46° 53′, W. 45° 04′ to N. 47° 16′, W. 43° 04′, a medium and two small bergs.

3d—N. 46° 57′, W. 40° 29′, a large berg about 100 feet high and one-half mile long; N. 46° 43′, W. 40° 34′, a berg about 60 feet high and 400 feet long, and several detached pieces.

4th.—N. 44° 08′, W. 47° 55′, a small berg; N. 44° 08′, W. 48° 02′, a berg 40 to 50 feet high and one-fourth mile long; N. 47° 49′, W. 50° 23′ to N. 48° 27′, W. 48° 52′, twenty bergs of various sizes.

4–5th.—N. 53° 05′, W. 51° 10′ to N. 52° 56′, W. 53° 40′, numerous bergs.

7th.—N. 48° 00′, W. 49° 30′, several small pieces of ice.

8th.—N. 47° 47′, W. 49° 02′, a large berg ten miles distant.

9th.—N. 43° 50′, W. 49° 00′, a small berg; N. 48° 14′, W. 48° 31′, a long low berg; N. 43° 13′, W. 49° 44′, several pieces of floe ice; N. 48° 22′, W. 47° 46′, a small flat berg one-half mile distant; N. 48° 26′, W. 47° 57′, a large berg.

10th.—N. 52° 34′, W. 52° 45′, several bergs in sight.

10–11th.—N. 52° 00′, W. 51° 00′, numerous bergs, packed, and field ice.

11th.—N. 42° 54′, W. 49° 54′, a large berg; N. 52° 10′, W. 46° 27′, two bergs; N. 48° 05′, W. 47° 50, two large and one small bergs.

13th.—N. 48° 15′, W. 46° 50′, five bergs; N. 46° 12′, W. 47° 04′ a large berg.

14th.—N. 48° 37′, W. 47° 24′, a small berg; N. 48° 16′, W. 47° 52′, a large berg; N. 48° 11′ W. 48° 50′, a large berg.

15th.—N. 44° 10′, W. 48° 10′, a large berg; N. 44° 38′, W. 47° 41′, a berg 200 feet high and 400 feet long; N. 44° 24′, W. 48° 30′, a berg 250 feet high and 400 feet long; N. 43° 55′, W. 48° 23′, a medium sized berg; N. 42° 56′, W. 49° 38′, two large and four medium sized bergs; N. 43° 36′, W. 48° 24′, two

large bergs six or seven miles to northward; N. 48° 35′, W. 48° 15′, one large and one small berg; N. 43° 21′, W. 48° 44′, two large bergs and six small detached pieces.

16th.—N. 52° 50′, W. 52° 03′, six large bergs within five miles; N. 52° 37′, W. 53° 21′, one very long flat berg; N. 51° 54′, W. 55° 00′, twelve large and small bergs; three bergs a little south of Belle Isle; N. 43° 32′, W. 48° 22′, a moderate sized berg seven miles distant; N. 43° 24′, W. 48° 44′, a moderate sized berg; N. 44° 15′, W. 48° 30′, a large berg; N. 52° 49′, W. 51° 45′, a large number of bergs, large and small.

18th.—N. 47° 37′, W. 46° 28′, a small berg; N. 43° 51′, W. 48° 10′, berg five miles distant; N. 49° 57′, W. 49° 45′, a berg.

19th.—N. 45° 19′, W. 47° 17′, six large bergs and nineteen small pieces and flakes of ice; N. 45° 05′, W. 48° 10′, a large berg and three small pieces of ice; N. 42° 57′, W. 48° 15′, a berg 45 feet high and 170 feet long; N. 48° 18′, W. 45° 57′ to N. 47° 30′, W. 47° 50′, large and small bergs and pieces of ice.

20th.—N. 44° 13′, W. 48° 27′, a berg about 130 feet high and 975 feet long; N. 43° 13′, W. 48° 02′, a small berg.

26th.—N. 48° 55′, W. 52° 53′, a berg 200 to 300 yards long.

27th.—N. 48° 42′, W. 47° 08′, a large berg.

28th.—N. 53° 10′, W. 51° 10′ to Belle Isle, passed upwards of one hundred and fifty bergs.

29th.—N. 53° 00′, W. 51° 15′ to Belle Isle, numerous bergs of various sizes.

Capt. Jas. McAuley, of the s. s. "Toronto," reports relative to ice off the north and east coasts of Newfoundland as follows: "June 10th, in N. 52° 10′, W. 54° 00′, passed a large number of small icebergs and quantities of field ice, and came up to a solid barrier of field ice, so compact as to render it impossible to proceed farther towards Belle Isle. Ran ship twenty-five miles to northward, but could find no break in the ice, then kept to southward for Cape Race. Passed many large bergs from N. 52° 35′, W. 54° 00′ to Cape Race. Last bergs, two very large ones, in N. 47° 30′, W. 52° 25′." Capt. Joseph Wall, of the s. s. "Montreal," reports that on June 16th and 17th, from N. 51° 52′, W. 55° 10′, westward through the Straits of Belle Isle, no icebergs or field ice were seen.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for June, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

In June, 1889, the mean temperature was highest in the lower valleys of the Gila and Colorado Rivers, where, at stations in adjoining parts of Arizona and California, and in the extreme southern part of Nevada, it rose above 90°, the highest mean value, 92°, being reported at El Dorado Canyon, Nev. At stations in the west valley of the Sacramento River, and within an area extending from Kern county northward over the east portions of Tulare and Fresno counties, Cal., the mean temperature was above 85°. The mean readings were above 80° over the extreme southern and southwestern portion of Florida, at stations on the west Gulf coast, in the Rio Grande Valley, southwestern Arizona, extreme southern Nevada, and at stations in southeastern, east-central, and north-central California. The lowest mean temperature was reported in central Colorado, where at stations the values fell below 50°. In the lower valley of the Saint Lawrence River the mean readings were below 55°, and the values were below 60° at the more northern stations in the Lake region, at Bandon, Oregon, and on the coast of Washington Territory.

From the Pacific coast eastward over the plateau regions, except in southern California and southern Arizona; along the northern boundary of the United States and in adjoining parts of British America west of the ninety-fifth meridian, and on the Atlantic coast north of the fortieth parallel the mean temperature was above the normal. In all other portions of the country, embracing districts from the Lake region and upper Missouri valley southward to the Gulf of Mexico and the Rio Grande Valley, and in the Saint Lawrence Valley, the month was cooler than the average June. The most marked departures above the normal temperature were reported in northern and east-central California, Nevada, north-central Montana, the British Possessions lying north of Montana and Dakota, and in eastern New Brunswick and eastern Nova Scotia, where they were more than 5°. The departures below the normal nowhere amounted to 5°, save in northern Louisiana and Indian Territory.

Considered by districts, the greatest average departure above the normal temperature occurred on the middle Pacific coast, where it was 2°.6; in the middle plateau region the average departure above the normal was 2°.4; on the north Pacific coast 2°.1; in the northern plateau region, 2°.0; in New England, 1°.4; in the southern plateau region, 1°.1, and on the north Pacific coast, 0°.4. The greatest average departure below the normal, 4°.6, occurred over the southeastern slope of the Rocky Mountains; the average departures varied between 2°.0 and 4°.0 in Florida, the east and west Gulf states, Ohio Valley, lower lakes, upper lakes, upper Mississippi valley, and the middle-eastern slope of the Rocky Mountains, and in the middle and south Atlantic states, Rio Grande Valley, extreme northwest, Missouri Valley, and on the south Pacific coast they were less than 2°.0.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.	°	Below normal.	°
Winnemucca, Nev.	6.6	Shreveport, La.	5.2
Fort Assinniboine, Mont	6.6	Fort Sill, Ind. T.	5.1
Winnipeg, Manitoba	6.0	Saint Louis, Mo.	4.4
Chatham, N. B.	6.0	Little Rock, Ark.	4.4
Eureka, Cal.	5.7	Alpena, Mich.	4.4

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for June, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for June during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of June.	(2) Length of record.	(3) Mean for June, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for June.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	76.8	7	74.9	−1.9	80.2	1885	74.9	1889
California.									
Sacramento	Sacramento	70.3	36	67.8	−2.5	77.0	1853	65.6	1860
Colorado.									
Fort Lyon	Bent	74.1	20	69.0	−5.1	79.3	1881	69.0	1889
Connecticut.									
Middletown	Middlesex	66.5	22	67.0	+0.5	72.6	1876	62.9	1865

Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of June.	(2) Length of record.	(3) Mean for June, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for June.			
						Highest.	Year.	Lowest.	Year.
Florida.		°	Years	°	°	°		°	
Merritt's Island	Brevard	79.5	5	75.4	−4.1	81.0	1887	75.4	1889
Georgia.									
Forsyth	Monroe	76.3	15	77.0	+0.7	81.9	1880, '81	74.2	1884
Illinois.									
Peoria	Peoria	73.9	33	69.9	−4.0	79.7	1873	69.4	1869
Riley	McHenry	66.8	33	63.1	−3.7	73.9	1856	62.1	1862
Indiana.									
Vevay	Switzerland	73.4	23	70.2	−3.2	77.9	1867	68.4	1869
Iowa.									
Cresco	Howard	66.2	16	63.0	−3.2	72.0	1873	62.8	1877
Monticello	Jones	65.4	35	66.8	+1.4	74.0	1859	64.1	1863
Logan	Harrison	69.9	15	70.7	+0.8	74.4	1887	64.5	1876
Kansas.									
Lawrence	Douglas	73.6	20	71.2	−2.4	77.2	1881	69.8	1878
Wellington	Sumner	74.0	10	65.8	−8.2	78.4	1881	65.8	1889
Louisiana.									
Grand Coteau	Saint Landry	79.8	6	78.3	−1.5	81.7	1885	78.2	1887
Maine.									
Gardiner	Kennebec	62.8	49	.....	.....	67.3	1856	58.2	1881
Maryland.									
Cumberland	Allegany	68.5	29	67.2	−1.3	74.0	1874	63.5	1863
Massachusetts.									
Amherst	Hampshire	66.6	53	67.2	+0.6	70.6	1876	59.0	1863
Newburyport	Essex	65.0	11	67.5	+2.5	68.2	1883	59.4	1881
Somerset	Bristol	68.7	17	71.1	+2.4	72.2	1876	64.3	1881
Michigan.									
Kalamazoo	Kalamazoo	67.1	12	63.7	−3.4	70.0	1887	63.7	1889
Thornville	Lapeer	67.6	12	65.5	−2.1	70.4	1880	64.1	1881
Minnesota.									
Minneapolis	Hennepin	66.6	24	65.9	−0.7	72.0	1873	61.9	1877
Montana.									
Fort Shaw	Lewis & Clarke	62.7	20	63.1	+0.4	70.6	1871	58.1	1877
New Hampshire.									
Hanover	Grafton	64.0	55	65.4	+1.4	69.8	1870	57.9	1839
New Jersey.									
Moorestown	Burlington	70.3	26	69.1	−1.2	73.8	1865	66.3	1886
South Orange	Essex	69.0	17	68.4	−0.6	73.6	1876	63.4	1881
New York.									
Cooperstown	Otsego	64.0	35	62.9	−1.1	71.9	1870	57.3	1863
Palermo	Oswego	64.5	35	63.0	−1.5	71.6	1870	59.4	1855
North Carolina.									
Lenoir	Caldwell	71.1	17	69.0	−2.1	75.0	1874	63.6	1887
Ohio.									
N'th Lewisburgh	Champaign	68.9	57	68.4	−0.5	74.0	1865	61.0	1879
Wauseon	Fulton	68.4	19	64.8	−3.6	72.4	1873	64.8	1889
Oregon.									
Albany	Linn	61.4	10	66.1	+4.7	66.1	1889	59.1	1880
Eola	Polk	59.6	19	65.0	+5.4	65.0	1889	54.5	1873
Pennsylvania.									
Dyberry	Wayne	64.2	22	63.0	−1.2	68.2	1870	60.4	1881
Grampian Hills	Clearfield	66.3	24	66.7	+0.4	70.0	1865	61.3	1878
Wellsborough	Tioga	66.2	10	64.6	−1.6	74.6	1883	61.1	1881
South Carolina.									
Statesburgh	Sumter	76.3	8	74.1	−2.2	80.5	1881	72.4	1884
Tennessee.									
Austin	Wilson	76.2	18	73.4	−2.8	85.5	1874	72.1	1878
Milan	Gibson	73.8	6	71.6	−2.2	75.4	1885	71.6	1889
Texas.									
New Ulm	Austin	80.4	16	77.4	−3.0	85.0	1881	77.4	1889
Vermont.									
Strafford	Orange	66.0	16	66.8	+0.8	71.1	1884	58.4	1881
Virginia.									
Bird's Nest	Northampt'n	74.4	21	73.6	−0.8	77.7	1880	70.4	1887
Wytheville	Wythe	68.3	25	59.4	−8.9	73.0	1874	59.4	1889
Wisconsin.									
Madison	Dane	67.8	17	63.5	−4.3	72.4	1873	62.5	1869
Washington.									
Fort Townsend	Jefferson	59.0	16	60.7	+1.7	61.7	1888	56.0	1879

The above table shows that the mean temperature for the month was above the highest mean reported for the corresponding month of previous years at the stations named in Oregon. At Albany, with a record of ten years, and at Eola, with a record of nineteen years, the mean for the current month was 2°.1 and 2°.7, respectively, above the highest previous mean noted for 1883. At a number of stations in the interior and more southern districts the mean temperature for the month was lower than the lowest mean reported for June of previous years. At Lead Hill, Ark., with a record of seven years, the mean temperature for June, 1889, was 0°.5 below the lowest previous mean reading for June, reported in 1886; Fort Lyon, Colo., twenty years record, 0°.3 below mean of 1878; Merritt's Island, Fla., five years record, 2°.9 below mean of 1888; Wellington, Kans., ten years record, 5°.4 below mean of 1886; Kalamazoo, Mich., twelve years record 1°.1 below mean of 1878; Wauseon, Ohio, nineteen years record, 0°.7 below mean of 1881; Milan, Tenn., six years record, 0°.8 below mean of 1884; New Ulm, Tex., sixteen years record, 0°.8 below mean of 1877, and Wytheville, Va., twenty-five years record, 4°.6 below mean of 1878.

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported at Signal Service stations was noted in the lower Colorado and middle and lower Gila valleys in Arizona, the highest reading, 112°, being registered at Fort McDowell, Ariz. Within an area extending from the vicinity of Ashland, Oregon, east of south over the Sacramento and San Joaquin Valleys to Tulare Lake the maximum values rose above 100°, the highest reading, 106°, being noted at Fresno, Cal. The temperature also rose to or above 100° at Walla Walla, Wash., Fort Custer, Mont., Fort Buford, Dak., El Paso and Rio Grande City, Tex., Lava, N.Mex., and Micco, Fla. The following are maximum readings in the several states and territories where temperature above 100° was reported, as shown by reports of United States Army post surgeons and state weather service and voluntary observers: Fort Mojave and Texas Hill, Ariz., 113°; Volcano Springs and Cactus, Cal., 120° and 115°, respectively; Grant's Pass, Oregon, 102°; El Dorado Canyon, Nev., 110°; Saint George, Utah, 107°; Powder River, Mont., 110°; Bennet, Colo., 112°; Fort Selden, N. Mex., 106°; Forts Ringgold and Hancock, Tex., 108°; Lead Hill, Ark., 100°; Willow Springs, Mo., 100°; Brookville, Kans., 107°; Fort Buford, Dak., 104°; Ansley, Nebr., 104°; Cameron, La., 101°; Columbus, Miss., 104°; Wiggins, Ala., 101°; Millen, Ga., 100°, and Spartanburgh, S. C., 100°. The lowest maximum temperatures at regular Signal Service stations were reported on the California coast, where 66°, 68°, 72°, and 75° were reported at Eureka, Point Reyes Light, San Diego, and San Francisco, respectively. On the northwest coast of Washington Territory, and along the extreme southern coasts of Massachusetts and Rhode Island the maximum values fell below 80°.

At the following-named stations, all of which have comparatively short records, the maximum temperature was higher than has been noted for the corresponding month of previous years: Huron, Dak., eight years record, 1° above maximum of 1887; Linkville, Oregon, five years record, 2° above maximum of 1887; Neah Bay, Wash., five years record, 2° above maximum of 1886 and 1888; Astoria, Oregon, five years record, 4° above maximum of 1887. At a majority of stations in New England and the eastern part of the middle Atlantic states the highest temperature for June was recorded in 1888; in Virginia, the Carolinas, eastern Tennessee, and northern Georgia in 1887; in northern Florida in 1880; in the Ohio Valley and at Lake Erie stations in 1874; in southern Michigan in 1888; in Minnesota, Dakota, and Montana in 1883; in Oregon and Nevada in 1887; in west-central California in 1883; in Arizona mostly in 1883 and 1887; elsewhere the periods of occurrence were irregular. The highest temperature ever reached in any month at a regular Signal Service station was 119° at Fort McDowell, Ariz., in June, 1887, and at Phœnix, Ariz., in June, 1883. Among extremely high temperatures reported for June in preceding years by United States Army post surgeons or voluntary observers are, 121° at Fort Miller, Cal., in 1853; 120° at Fort McRae, N. Mex., 1873, and 119° at Fort Mojave, Ariz., 1876.

The only regular stations of the Signal Service reporting temperature below 32° were Fort Klamath, Oregon, where the temperature fell to 30° on the 23d, and Cheyenne, Wyo., where a reading of 31° was reported for the 9th. From northern New England and the Saint Lawrence Valley westward over the northern portion of the Lake region and the upper Missouri valley, and thence southward over the Rocky Mountain regions to southern New Mexico the temperature fell below 40°. The highest minimum temperature reported was 71°, at Key West, Fla. Over the southern half of Florida, along the west Gulf coast, and in adjoining parts of southern California and Arizona the minimum temperatures for the month generally ranged above 60°. At a number of stations in the Ohio and upper Mississippi valleys, and thence southward and south-

eastward to the Gulf and south Atlantic coasts the minimum temperature was the lowest noted for June during the periods of observation. At Lynchburgh, Va., with a record of seventeen years, the minimum temperature for the current month was 4° below the lowest reading for June, which occurred in 1880; Charlotte, N. C., eleven years record, 7° below minimum of 1884; Charleston, S. C., seventeen years record, 6° below minimum of 1887; Augusta, Ga., seventeen years record, 11° below minimum of 1882; Savannah, Ga., nineteen years record, 8° below minimum of 1884; Jacksonville, Fla., eighteen years record, 8° below minimum of 1884; Cedar Keys, Fla., ten years record, 6° below minimum of 1884; Atlanta, Ga., eleven years record, 15° below minimum of 1879; Pensacola, Fla., ten years record, 9° below minimum of 1881 and 1888; Mobile, Ala., nineteen years record, 10° below minimum of 1888; Montgomery, Ala., seventeen years record, 9° below minimum of 1888; Vicksburg, Miss., seventeen years record, 1° below minimum of 1879; New Orleans, La., nineteen years record, 7° below minimum of 1879; Little Rock, Ark., ten years record, 4° below minimum of 1882; Chattanooga, Tenn., eleven years record, 12° below minimum of 1879; Knoxville, Tenn., nineteen years record, 3° below minimum of 1878; Memphis, Tenn., seventeen years record, 6° below minimum of 1888; Nashville, Tenn., nineteen years record, 2° below minimum of 1888; Louisville, Ky., seventeen years record, 5° below minimum of 1875; Indianapolis, Ind., sixteen years record, the same as minimum of 1885; Cincinnati, Ohio, eighteen years record, 9° below minimum of 1885; Columbus, Ohio, eleven years record, 2° below minimum of 1886; Sandusky, Ohio, eleven years record, 2° below minimum of 1888; Davenport, Iowa, eighteen years record, 4° below minimum of 1876 and 1882; Des Moines, Iowa, eleven years record, 6° below minimum of 1888; Keokuk, Iowa, eighteen years record, 2° below minimum of 1877; Cairo, Ill., eighteen years record, 4° below minimum of 1877; Springfield, Ill., ten years record, 1° below minimum of 1888; Saint Louis, Mo., nineteen years record, 1° below minimum of 1877. At Lava, N. Mex., with a record of five years, the temperature was 3° below the minimum of 1885, and at Montrose, Colo., five years record, 1° below minimum of 1888. In the lower lake region the absolute minimum temperature for June, for preceding years, occurred at most stations in 1879; in the Rio Grande Valley in 1877; in the extreme northwest in 1888; elsewhere the periods of occurrence were irregular.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred in the upper Missouri valley, and in the Gila valley in south-central Arizona, where they exceeded 60°. From the Rocky Mountain and southern plateau regions and the upper Missouri valley the ranges decreased towards the oceans and the Gulf coast. The monthly ranges were least along the California coast and over the southern extremity of Florida, where they were less than 20°. On the coasts of North Carolina, Rhode Island, southern Massachusetts, and along the north Pacific coast the ranges were less than 40°.

The following are some of the extreme monthly ranges:

Greatest.	°	Least.	°
Fort Custer, Mont	64.0	San Diego, Cal	16.0
Fort Buford, Dak	63.0	Key West, Fla	18.0
Fort McDowell, Ariz	62.0	Eureka, Cal	21.0
Brock, Utah	58.0	San Francisco, Cal	23.0
Pueblo, Colo	57.0	Block Island, R. I	24.0

FROST.

Frost was reported generally throughout the interior of the south Atlantic and east Gulf states and as far south as Bermuda, Ala., on the 1st. C. M. Witcher, at Point Peter, Ga., reports that the effect of the frost was plainly visible on cotton, corn, and peas. Damaging frosts were also reported in some parts of Iowa on the 1st, killing tender vegetables and retarding the growth of corn. Frost occurred most frequently in north-central Colorado, where, at stations, it was reported for nearly every date in the month. The occurrence of frost in June in the south Atlantic and east Gulf states, which, in localities, appears to have affected tender vegetation, is unusual if not unprecedented. Its occurrence attended the low temperature of that date, which, at a majority of the Signal Service stations in those districts, was the lowest recorded for June. The average dates of last damaging frosts for stations in the south Atlantic and east Gulf states occur in March. In Iowa, where at nearly all Signal Service stations the temperature was the lowest on record for June on the 1st, killing frosts were more than one month later than usual.

Frost was observed by dates during the month as follows: *Alabama.*—Bermuda, Motes, New Market, Valley Head, 1st. *Arizona.*—Belmont, 4th, 5th, 6th. *Colorado.*—Coulter, 1st to 20th; Frazer, 1st to 14th, 16th to 30th; Fort Collins, 4th; Palmer Lake, 8th, 10th; "B" Grand Lake, 1st to 30th. *Dakota.*—Spearfish, 2d; Gallatin, 3d, 4th, 15th, 16th. *Georgia.*—Atlanta, Marietta, Point Peter, 1st; Duck, 1st, 2d, 6th, 7th. *Iowa.*—Ames, Manson, Oskaloosa, Wesley, 1st; Hampton, 1st, 2d; Bancroft, 1st, 22d; Osage, 2d. *Kansas.*—La Harpe, 1st, 16th, 20th. *Michigan.*—Lansing, 23d. *Minnesota.*—Pokegama Falls, 22d. *Missouri.*—Glascow, Miami, Mexico, Savannah, 1st. *Montana.*—Sheldon, 6th, 14th, 24th. *Nebraska.*—Hay Springs, 4th. *Nevada.*—Carson City, 14th, 16th. *New Hampshire.*—Berlin Mills, 17th. *New York.*—Canton, Ilion, Middleburgh, Number Four, 7th, Arcade, 23d. *North Carolina.*—Lenoir, Mount Pleasant, 1st; Highland, 1st, 2d; Poland, 6th. *Ohio.*—New Athens, 1st; Wauseon, 4th; Greenville, Shanesville, Westerville, 6th. *Oregon.*—Fort Klamath, 23d, 24th. *Pennsylvania.*—Head Waters of Bob's Creek, 1st, 2d, 6th, 7th, 23d; Dyberry, Honesdale, 7th; Wellsborough, 23d, 24th; Philipsburgh, 24th. *South Carolina.*—Cedar Springs, 1st. *Tennessee.*—Chattanooga, Fayetteville, McMinnville, Nunnelly, 1st. *Utah.*—Beaver, 9th, 10th, 11th; Nephi, 9th, 10th. *Vermont.*—Strafford, 7th; Coventry, East Berkshire, Northfield, 18th. *Wisconsin.*—Weston, 4th; Embarras, Fond du Lac, 5th; Friendship, 22d. *Wyoming.*—Cheyenne, 11th.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for June, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
	°	°	°	°	°
Boston, Mass	63.0	54.8	8.2	58.9	69.2
Canby, Fort, Wash	67.5	58.0	9.5	62.1	56.6
Cedar Keys, Fla	90.1	73.1	17.0	84.3	78.6
Charleston, S. C	83.2	76.0	7.2	79.4	76.8
Eastport, Me	47.4	42.6	4.8	45.2	56.9
Galveston, Tex	85.0	75.0	10.0	81.3	79.0
Key West, Fla	88.9	76.0	12.9	85.0	80.8
Nantucket, Mass	73.5	55.0	18.5	67.3	63.6
New York City	68.2	58.4	9.8	64.2	70.4
Pensacola, Fla	83.5	72.0	11.5	79.6	77.2
Portland, Oregon	74.7	67.9	6.8	71.0	66.0

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for June, 1889, as determined from the reports of over 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geograph-

ical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In June, 1889, the precipitation was greatest in areas covering north-central New York, north-central Pennsylvania, central and east-central North Carolina, central Florida, north-central Mississippi, south-central and central Illinois, eastern and central Texas, and from eastern Louisiana to northeastern Texas, where it exceeded ten inches. The only regular stations of the Signal Service reporting rainfall to exceed ten inches were Charlotte, Hatteras, and Raleigh, N. C., and Titusville, Fla., where 10.54, 11.91, 10.44, and 11.62 inches, respectively, were recorded. At stations within an area extending from the Gila Valley in southwestern Arizona northwestward to the California coast, between about latitude N. 35° to 37°, no precipitation was reported. Over a greater part of the plateau regions less than one-half inch fell. On the Pacific coast the precipitation was greatest from the mouth of the Columbia River northward along the coast of Washington Territory, where, at stations, it exceeded two inches.

The precipitation for June, 1889, was generally above the normal from the west Gulf states eastward to the south Atlantic states, and thence northward to the lower lake region, and northeastward to the Canadian Maritime Provinces, except at stations along the immediate Gulf coast from Galveston, Tex., eastward, within an elongated area extending from Wilmington, N. C., to Augusta, Ga., along the New Jersey and south New England coasts, and at stations on the coasts of Nova Scotia and New Brunswick. The rainfall was also above the average for the month in the central parts of the upper lake region, over the middle eastern slope of the Rocky Mountains, at stations in southern New Mexico and southeastern Arizona, in the Sacramento Valley, and at San Diego, Cal. In other districts the precipitation was generally below the normal. The greatest departures above the normal precipitation occurred in eastern and southwestern North Carolina, along the southeastern shore of Lake Ontario, and in west-central Mississippi, where they exceeded five inches, and amounted to 7.27, 6.64, 5.95, and 5.89 inches at Hatteras, N. C., Oswego, N. Y., Charlotte, N. C., and Vicksburg, Miss., respectively. The most marked departures below the normal precipitation were noted in northern Minnesota and in the valley of the Red River of the north, where they were more than three inches. The deficiencies exceed two inches from Minnesota westward over the northern portion of Dakota and the central and northern parts of Montana, in northern Missouri and adjoining parts of Missouri, Iowa, and Illinois, at Cleveland and Sandusky, Ohio, and on the extreme west coast of Florida.

In districts where the precipitation was in excess the average percentages above the normal were about as follows: New England, 2 per cent.; middle Atlantic states, 25 per cent.; south Atlantic states, 51 per cent.; Florida peninsula, 7 per cent.; east Gulf states, 8 per cent.; west Gulf states, 45 per cent.; Rio Grande Valley, 41 per cent.; Ohio Valley, 15 per cent.; lower lakes, 24 per cent.; middle eastern slope of the Rocky Mountains, 4 per cent.; and southeastern slope of the Rocky Mountains, 35 per cent. In districts where the precipitation was below the normal the percentages of the normal precipitation was about as follows: upper lakes, 92 per cent.; extreme northwest, 32 per cent.; upper Mississippi valley, 85 per cent.; Missouri Valley, 59 per cent.; northern slope of the Rocky Mountains, 50 per cent.; southern plateau region, 60 per cent.; middle plateau region, 21 per cent.; northern plateau region, 34 per cent.; north Pacific coast, 51 per cent.; middle Pacific coast, 86 per cent.; south Pacific coast, 50 per cent.

In the preceding month there was an excess of rainfall in New England, the lower lake region, the Ohio Valley, and the middle Atlantic states, and reports show that an excess was noted for those districts for the current month. In the south Atlantic and Gulf states there was a marked deficiency in May, where for the current month there was an excess of rainfall. Over the northern portion of the country, from Minnesota westward to the Pacific coast and in the middle plateau and middle Pacific coast regions, the rainfall was in excess of the average during May, while for June there were marked deficiencies in those districts, more especially from the Columbia Valley eastward to Minnesota, and in the middle plateau region. On the middle Pacific coast the rainfall in May averaged about three and one-half times the normal amount, while for the current month it is below the average. The deficiency on the south Pacific coast and in the southern plateau region continues.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for June, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for June during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of June.	(2) Length of record.	(3) Total for June, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for June.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	5.00	7	4.70	−0.30	7.14	1882	2.87	1888
California.									
Sacramento	Sacramento	0.13	39	0.28	+0.15	1.57	1884	0.00	*
Colorado.									
Fort Lyon	Bent	1.38	20	1.41	+0.03	4.08	1878	T.	1879
Connecticut.									
Middletown	Middlesex	4.72	27	3.34	−1.38	8.05	1862	0.49	1873
Florida.									
Merritt's Island	Brevard	7.24	11	14.28	+7.04	14.28	1889	3.32	1878
Georgia.									
Forsyth	Monroe	4.43	15	7.94	+3.51	11.14	1886	1.48	1879
Illinois.									
Peoria	Peoria	3.79	33	6.30	+2.51	11.18	1882	0.45	1863
Riley	McHenry	4.17	38	3.25	−0.92	9.68	1869	0.41	1863
Indiana.									
Logansport	Cass	4.22	16	4.79	+0.57	8.99	1882	0.55	1863
Vevay	Switzerland	4.68	23	4.46	−0.22	8.41	1875	1.30	1873
Iowa.									
Cresco	Howard	4.75	16	4.91	+0.16	9.34	1875	2.46	1887
Monticello	Jones	4.35	34	4.89	+0.54	9.02	1865	0.74	1857
Logan	Harrison	5.41	23	9.87	+4.46	10.61	1878	0.30	1870
Kansas.									
Lawrence	Douglas	5.10	23	4.04	−1.06	12.11	1876	1.30	1872
Wellington	Sumner	4.45	10	5.57	+1.12	7.71	1886	2.43	1887
Louisiana.									
Grand Coteau	St. Landry	5.82	6	4.90	−0.92	11.31	1886	2.50	1884
Maine.									
Gardiner	Kennebec	3.31	49	.....	.....	6.35	1859	0.65	1864
Maryland.									
Cumberland	Allegany	3.41	17	3.10	−0.31	5.84	1880	0.86	1885
Massachusetts.									
Amherst	Hampshire	3.76	52	5.40	+1.64	11.69	1862	1.38	{1864 1884}
Newburyport	Essex	2.84	11	4.35	+1.51	5.94	1879	1.57	1880
Somerset	Bristol	3.10	17	3.13	+0.03	7.60	1875	1.29	1886
Michigan.									
Kalamazoo	Kalamazoo	4.85	13	4.94	+0.09	8.10	1883	1.78	1878
Thornville	Lapeer	3.99	12	2.38	−1.61	9.14	1883	1.92	1886
Minnesota.									
Minneapolis	Hennepin	4.36	23	1.53	−2.83	9.68	1874	1.53	1889
Montana.									
Fort Shaw	Lewis&Clarke	1.95	19	0.60	−1.35	4.98	1879	0.20	1876
New Hampshire.									
Hanover	Grafton	3.47	47	3.61	+0.14	7.27	1838	0.73	1864
New Jersey.									
Moorestown	Burlington	3.86	26	3.44	−0.42	7.56	1867	1.61	1864
South Orange	Essex	3.40	17	3.54	+0.14	6.02	1884	1.00	1885
New York.									
Cooperstown	Otsego	4.20	35	5.95	+1.75	9.76	1855	0.95	1870
Palermo	Oswego	3.24	35	7.17	+3.93	8.80	1865	0.70	{1864 1870}
North Carolina.									
Lenoir	Caldwell	4.16	17	5.90	+1.74	10.30	1884	0.90	1881
Ohio.									
N. Lewisburgh	Champaign	3.93	17	3.80	−0.13	10.60	1877	1.05	1886
Wauseon	Fulton	4.20	17	3.69	−0.51	8.43	1881	1.43	1872
Oregon.									
Albany	Linn	1.68	10	0.55	−1.13	5.31	1888	0.22	1883
Eola	Polk	1.38	18	0.45	−0.93	5.06	1888	0.05	1883
Pennsylvania.									
Dyberry	Wayne	2.83	18	4.24	+1.41	5.38	1883	1.13	1873
Grampian Hills	Clearfield	4.38	17	3.71	−0.67	9.85	1884	1.31	1867
Wellsborough	Tioga	6.96	10	10.04	+3.08	17.47	1881	2.01	1886
South Carolina.									
Statesburgh	Sumter	3.27	8	5.10	+1.83	5.35	1886	1.38	1881

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of June.	(2) Length of record.	(3) Total for June, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for June.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Tennessee.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Austin	Wilson	5.16	19	5.58	+0.42	8.92	1878	0.66	1874
Milan	Gibson	4.27	6	8.81	+4.54	8.81	1889	2.66	1887
Texas.									
New Ulm	Austin	3.92	16	6.31	+2.39	11.33	1873	0.51	1885
Vermont.									
Strafford	Orange	3.30	16	5.20	+1.90	6.30	1876	1.60	1884, 1885
Virginia.									
Bird's Nest	Northampton	3.29	20	5.25	+1.96	8.15	1881	1.00	1882
Wytheville	Wythe	3.85	24	8.08	+4.23	9.10	1875	1.30	1888
Wisconsin.									
Madison	Dane	4.09	19	2.00	−2.09	9.31	1880	1.08	1886
Washington.									
Fort Townsend	Jefferson	1.56	14	0.29	−1.27	4.10	1875	0.24	1886

*Frequently.

Table of excessive precipitation, June, 1889.

State and station.	Monthly rainfall 10 inches or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Montgomery		2.67	14	2.53	1 03	14
Arkansas.						
Fulton		3.02	10			
Helena		2.58	14			
Hot Springs		4.00	29			
Lead Hill				1.07	0 45	26
Dakota.						
Armour				1.00	0 50	19
Onida				1.00	0 30	17
Spring Lake		3.00	25	3.00	1 15	25
Webster		3.90	17	3.90	2 45	17
Florida.						
Alva	11.81	2.76	17			
Archer		3.25	17			
Fort Barrancas		3.19	26-27			
Fort Meade		3.45	16			
Homeland		3.75	16-17			
Key West		2.72	15-16			
Live Oak	10.12	2.50	29			
Manatee	11.10	3.63	16-17			
Mantanzas		3.38	15-16			
Meritt's Island	14.28	5.27	23	3.00	1 00	23
Do		3.73	24			
Saint Francis Barracks		3.05	15			
Titusville	11.62					
Villa City	11.26					
Georgia.						
Atlanta				1.05	0 40	19
Columbus		3.00	29			
Diamond	11.88	4.25	27	2.00	0 30	21
Duck		2.83	27-28			
Newnan		2.80	21			
Savannah		3.10	27-28	1.35	1 00	27
Illinois.						
Atwood	10.17					
Flora	11.49					
Pekin		3.25	7			
Peoria (1)		3.73	7	2.80	1 00	7
Peoria (2)		4.06	8			
Philo	11.16	4.25	7			
Richview	10.04					
Windsor				2.01	1 25	20
Indiana.						
Columbus		3.11	8			
Dana		2.56	8			
Marengo		3.00	8			
Rockville		2.60	7			
Shelbyville		2.60	8			
Worthington		3.31	8			
Indian Territory.						
Fort Reno		3.45	24			
Guthrie		3.15	16-17			
Iowa.						
Blakeville		3.00	8			
Clarinda				1.75	0 20	20
Eagle Grove		2.50	6			
Fayette		2.93	8-9			
Grinnell				1.30	1 00	26
Logan		3.55	15			
Do		3.15	20			
Muscatine (1)		3.50	16			
Muscatine (2)		2.62	15-16			
Sac City		3.00	6-7			
Kansas.						
Atwood	10.03	3.00	9			
Elco		3.45	15			
Ellis		4.10	29			
Emporia*		3.58	28			
Fort Scott		6.45	15-16			
Grenola		3.40	8-9			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Kansas—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Halstead		3.34	15			
La Harpe		2.65	16			
Lebo		2.90	15-16			
Marmaton		6.60	15-16			
McAllaster		3.05	9			
Ogallah		2.50	29			
Stockton		3.00	8	2.00	1 30	8
Winfield		2.50	15			
Kentucky.						
Falmouth				1.85	1 30	30
Franklin				1.02	1 00	16
Louisville				1.14	1 00	27
Louisiana.						
Alexandria	14.58	3.79	10			
Do		4.68	19			
Do		3.02	30			
Baton Rouge		3.34	29-30			
Cheneyville	10.19	5.90	10			
Convent	10.95	2.91	10			
Crowley	15.51	5.56	6			
Jackson Barracks		2.80	27			
Lafayette	12.40	3.02	21			
Lake Providence	13.88	3.40	12			
Do		3.50	13			
Liberty Hill	10.35					
Marksville	10.33	2.50	10	1.50	1 10	19
Maurepas		3.00	30			
New Orleans		2.86	26			
Do		2.76	30			
Pointe à la Hache	11.86	3.00	26			
Port Eads		3.00	26			
Massachusetts.						
Amherst		2.68	11			
Nahant				1.34	1 15	5
Northampton		3.82	11			
Michigan.						
Albion		2.54	18			
Fort Mackinac		2.58	14-15			
Olivet		2.77	9			
Sand Beach		2.54	15			
Mississippi.						
Aberdeen		2.50	14			
Batesville		2.50	14			
Booneville		3.22	13			
Corinth		2.50	13			
Do		2.75	14			
Hazlehurst		3.00	30			
Hernando		3.40	14			
Lock Leven		3.64	29			
Louisville				1.59	0 30	17
Macon		2.80	29			
Okolona		2.60	13			
Rienzi		2.56	13			
Ripley		2.60	12			
Vicksburg		2.50	11-12			
Water Valley		2.50	14			
Missouri.						
Grand Pass		3.73	7-8			
New Frankford		4.60	7-8	2.60	1 30	29
Do		2.60	29			
Willow Springs		3.20	26			
Nebraska.						
Oakdale		2.65	20			
New Jersey.						
Ocean City		2.70	1			
New Mexico.						
Los Lunas		2.62	21	2.62	1 45	21
New York.						
Hess Road Station	12.13	2.61	26			
Madison Barracks	11.50	4.23	26-27			
Nineveh	12.10	3.75	17			
Oswego		2.77	1			
South Canisteo		2.50	17			
Tannersville		5.00	26-27			
Watervleit Arsenal	10.30					
North Carolina.						
Charlotte	10.54	2.79	30	1.97	0 52	29
Do				2.08	0 34	30
Hatteras	11.91					
Lumberton		2.68	28			
Raleigh	10.44	5.18	28-29			
Wadesborough		3.00	28			
Weldon (2)	12 01	3.00	9			
Do		3.00	21			
Do		3.20	29			
Ohio.						
Akron				1.92	1 00	29
Ashland		2.54	30			
College Hill				2.00	2 00	26
Hiram				1.33	0 30	27
Sidney		2.60	18			
Pennsylvania.						
Erie		3.13	16-17			
Girardville		3.05	1			
Myerstown		2.68	21			
Nisbet		4.00	†			
Philipsburgh		3.26	1			
Tuscarora		2.55	1			
Wellsborough	10.04	7.45	†			
South Carolina.						
Charleston				1.12	1 00	27

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
South Carolina—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Timmonsville	.....	2.61	29	.....	.....	.....
Tennessee.						
McKenzie	.....	3.00	4	.....	.....	.....
Memphis	.....	4.12	12–13	2.34	1 15	13
Texas.						
Belton	10.98	3.57	12	.....	.....	.....
Do	.....	2.68	18	.....	.....	.....
Brownwood	.....	2.57	25	.....	.....	.....
College Station	.....	3.40	10	.....	.....	.....
Columbia Station	.....	3.01	28	.....	.....	.....
Dallas (1)	.....	3.00	30	.....	.....	.....
Dallas (2)	.....	2.64	30	.....	.....	.....
Decatur	.....	.....	.....	2.12	2 00	9
Duval	.....	2.50	18	.....	.....	.....
Fort Brown	.....	3.56	22–23	.....	.....	.....
Fort Clark	.....	2.50	29–30	.....	.....	.....
Houston	10.67	2.92	10	.....	.....	.....
Lampasas	12.65	4.26	12	3.08	2 20	30
Do	.....	3.08	30	.....	.....	.....
Longview	12.31	2.60	4	.....	.....	.....
Do	.....	3.30	10	.....	.....	.....
Luling	.....	4.00	10	.....	.....	.....
New Braunfels	.....	3.25	9	3.25	3 15	9
Rio Grande City	.....	.....	.....	1.05	0 49	22
Tyler	10.27	.....	.....	.....	.....	.....
Waco	.....	3.40	12	.....	.....	.....
Vermont.						
Coventry	12.35	4.75	9	.....	.....	.....
Newport	.....	3.00	9	.....	.....	.....
Virginia.						
Smithfield	.....	2.58	28–29	.....	.....	.....
Spottsville	.....	4.10	28–29	.....	.....	.....
Mexico.						
Topo Chico	.....	3.23	22	3.23	1 40	22
United States of Colombia.						
Colon	31.26	4.72	4	.....	.....	.....
Do	.....	6.30	16	.....	.....	.....
Do	.....	2.97	25	.....	.....	.....
Do	.....	2.51	26	.....	.....	.....

* May 28th, received too late for May REVIEW. † May 31 and June 1.

Monthly precipitation to equal or exceed ten inches was reported at nine stations in Louisiana, six stations in Florida, five stations in Texas, four stations in Illinois and North Carolin, four stations in New York, and one station each in Georgia, Kansas, Pennsylvania, and Vermont. In states and territories other than those named, precipitation to exceed ten inches was not reported for June, 1889. The heaviest rainfall reported was 15.51, at Crowley, La. At Merritt's Island, Fla., a depth of 14.28 was reported; at Lampasas, Tex., 12.65; at Coventry, Vt., 12.35, and at Hess Road Station, N. Y., and Weldon, N. C., 12.13 and 12.01, respectively. At other stations reporting excessive rainfall for the month the total depth varied from ten to twelve inches. At the Island of Dominica, West Indies, a total monthly rainfall of 44.36 inches was reported, and at Colon, United States of Columbia, a depth of 31.26 inches was noted. In June of preceding years precipitation to equal or exceed ten inches has occurred most frequently in Florida, where it has been reported for twenty-four years; in Missouri for seventeen years; in Iowa for sixteen years; in New York for fifteen years; in Illinois, Kansas, Louisiana, Ohio, South Carolina, and Texas for from ten to fourteen years, inclusive; in Alabama, Dakota, Georgia, Indiana, Michigan, Minnesota, Nebraska, New Hampshire, North Carolina, Pennsylvania, Tennessee, and Virginia for from five to nine years, inclusive, and in Arkansas, Colorado, Connecticut, Indian Territory, Maryland, Massachusetts, Mississippi, New Jersey, Rhode Island, Washington Territory, and Wisconsin for from one to four years, inclusive. In states and territories other than those named precipitation to exceed ten inches has not been reported for June for preceding years. On the Pacific coast this amount has been reported for June for one station and one year only, a depth of 10.28 inches being noted at Neah Bay, Wash., in 1888. Over the plateau and Rocky Mountain regions ten inches, or more, of rainfall for June have not been reported, save for Trinidad, Colo., where 12.83 inches were measured in 1878. Among notable monthly rainfalls reported for June are, 36.91 at Alexandria, La., in 1886; 29.56 at Fort Pike, La., in 1843; 29.35 at Fort Pierce, Fla., in 1853; 28.86 at Fernandina, Fla., in 1864; 26.59 at Cheneyville, La., in 1886; 25.58 at Fort Myers, Fla., in 1853; 24.56 at Fort Scott, Kans., in 1845; 21.86 at Sylvan Park, Minn., in 1872; and 20.15 at Sing Sing, N. Y., in 1867. Exclusive of the instances cited, monthly precipitation to equal or exceed fifteen inches has been reported for six years in Florida and Iowa; for four years in Louisiana and Missouri; for three years in Georgia; for two years in Alabama, Illinois, Kansas, Nebraska, New York, Ohio, Tennessee, and Texas, and for one year in Arkansas, Indian Territory, Michigan, New Hampshire, Pennsylvania, South Carolina, and Virginia.

Precipitation to equal or exceed 2.50 inches in twenty-four hours was reported at the greatest number of stations, fifteen, in Texas; at thirteen in Kansas and Louisiana; at twelve in Mississippi; at eleven in Florida; at from five to ten, inclusive, in Georgia, Indiana, Iowa, New York, North Carolina, and Pennsylvania; and in from one to four, inclusive, in Alabama, Arkansas, Dakota, Illinois, Indian Territory, Massachusetts, Michigan, Missouri, New Jersey, New Mexico, Ohio, South Carolina, Tennessee, Vermont, and Virginia. In states lying east of the one-hundredth meridian, other than those named, and in the Rocky Mountain and plateau regions and on the Pacific coast no daily rainfall to equal or exceed 2.50 inches was reported, except at Los Lunas, N. Mex., where 2.62 inches fell in one hour and forty-five minutes on the 21st. Among the heavier daily rainfalls for the month were: 5.90, at Cheneyville, La., on the 10th; 5.27, at Merritt's Island, Fla., 23d; 4.75, at Coventry, Vt., 9th; 4.26, at Lampasas, Tex., 12th; 4.25, at Philo, Ill., and Diamond, Ga., 7th and 27th, respectively; and 4.10 at Ellis, Kans., 29th. At Marmaton, Kans., 6.60 inches fell on the 15th and 16th; at Tannersville, N. Y., 5.00 inches, on the 26th and 27th; and at Wellsborough, Pa., 7.45 inches fell on May 31st and June 1st. At Colon, United States of Colombia, a depth of 6.30 inches was reported on the 16th.

Precipitation to equal or exceed 2.50 inches in twenty-four hours in June has been reported most frequently in Missouri, where it has been noted for twenty-one years; in Texas for sixteen; in Florida and Kansas for fifteen; in Illinois for fourteen; in Dakota for thirteen; in New York, Ohio, Minnesota, and Nebraska for eleven; in South Carolina and Georgia for ten; in Alabama, Arkansas, Connecticut, Indiana, Louisiana, Massachusetts, Michigan, Mississippi, New Jersey, North Carolina, Pennsylvania, Tennessee, and Virginia for from five to nine, inclusive; in Colorado, Delaware, Indian Territory, Kentucky, Maine, Montana, New Hampshire, Rhode Island, Vermont, and Wisconsin for from one to four years, inclusive. Daily rainfall to equal or exceed this amount has not been reported in the Rocky Mountain and plateau regions, or on the Pacific coast, except in Montana and Colorado. Among the heavier daily rainfalls reported for preceding years are: 22.27, at Alexandria, La., 16th, 1886; 10.70, at Pensacola, Fla., 29th, 1887; 10.24 at Fort Griffin, Tex., 21st, 1879; 9.70, at Sour Lake, Tex., 18th, 1888; 8.75, at Clear Creek, Nebr., 1st, 1875; 7.50, at Nashua, Iowa, 14th, 1880; 7.40, at Little Rock, Ark., 28th, 1879; 7.39, at Salisbury, N. C., 10th, 1883; 7.03, at Wilmington, N. C., 30th, 1876; 7.00, at Fort McPherson, Nebr., 25th, 1868; and Columbia, Tex., 17th, 1888. Exclusive of the instances named, daily rainfall to equal or exceed five inches has been reported in Alabama in 1888, in Arkansas and Ohio in 1877, in Dakota, Iowa, and Massachusetts in 1875, in Florida in 1879, in Illinois in 1874 and 1888, in Kansas in 1876 and 1878, in Kentucky and Louisiana in 1878, in Mississippi in 1886, in Missouri in 1848, in North Carolina in 1876 and 1885, in South Carolina in 1885, and in Texas in 1878 and 1884.

Rainfall to equal or exceed one inch an hour occurred on three dates in Dakota, Georgia, Kentucky, Texas, and Ohio; on two dates in Illinois, North Carolina, and Iowa; and on one date in Alabama, Arkansas, Florida, Kansas, Louisiana, Massachusetts, Mississippi, Missouri, New Mexico, South Carolina, and Tennessee. In the Rocky Mountain and plateau regions (except in New Mexico), on the Pacific coast, and in

the Lake region, middle Atlantic states, and New England, except in Massachusetts, rainfall to equal or exceed one inch an hour has not been reported. Among the heavier rainfalls reported for one hour or less are: 1.75 in twenty minutes, at Clarinda, Iowa, on the 20th; 2.00 in thirty minutes, at Diamond, Ga., 21st; 1.59 in thirty minutes, at Louisville, Miss., 17th; 2.08 in thirty-four minutes, at Charlotte, N. C., 30th; and 3.00 in one hour, at Merritt's Island, Fla., 23d. In June of preceding years rainfalls to equal or exceed this amount in the period given have been most frequently reported in Kansas, where they have been noted for eighteen years; in Georgia, Missouri, and Texas for thirteen years; in Nebraska for twelve years; in Illinois, Iowa, and Michigan for eleven years; in Dakota, Florida, Indiana, Louisiana, Minnesota, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia for from five to ten years, inclusive; and in Alabama, Arizona, Arkansas, Colorado, Connecticut, Indian Territory, Maine, Maryland, Massachusetts, Mississippi, Montana, New Hampshire, New Jersey, New Mexico, New York, West Virginia, Wisconsin, and Wyoming for from one to four years, inclusive. In the middle and northern plateau regions and on the Pacific coast no rainfalls to equal or exceed one inch in one hour have been reported for June for preceding years. Among the heavier rainfalls reported for one hour or less in June are: 0.30 in three minutes, 5th, 1885; 0.44 in five minutes, 6th, 1883; and 0.50 in ten minutes, 29th, 1882, at New York City. 0.37 in five minutes, at Augusta, Ga., 27th, 1888. 1.19 in thirteen minutes, at Anna, Ill., 20th, 1878. For fifteen minute periods: 1.45, at Southington, Conn., 29th, 1879; 1.56, at Fort Randall, Dak., 28th, 1873; 1.75, at Portsmouth, Ohio, 22d, 1851; and 2.02, at Erie, Pa., 17th, 1886. 1.02 in twenty minutes, at Lynchburgh, Va., 15th, 1879. 1.20 in twenty-five minutes, at Indianapolis, Ind., 4th, 1885. For thirty minute periods: 2.02, at Denmark, Iowa, 25th, 1879; 2.00, at Boston, Mass., 29th, 1879; 2.00, at Alpena, Mich., 24th, 1880; 2.00, at Galveston, Tex., 17th, 1888; 1.84, at Missoula, Mont., 13th, 1875; and 2.00, at Keeswick, Va., 3d, 1881. 3.03 in thirty-five minutes, at Clear Creek, Nebr., 25th, 1882. 1.81 in thirty-one minutes, at Jacksonville, Fla., 26th, 1875; and 3.24 in forty-five minutes, at Dodge City, Kans., 19th, 1888.

MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following is a record of the heaviest rainfalls during June, 1889, for periods of five and ten minutes, and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—						Maximum rate per minute.
	5 min.	Date.	10 min.	Date.	1 hour.	Date.	
	Inch.		*Inch.*		*Inch.*		*Inch.*
Boston, Mass.	0.15	5	0.25	5	0.50	5	0.03
Cincinnati, Ohio	0.15	15	0.30	15	0.45	15	0.03
Chicago, Ill.	0.05	16	0.05	16	0.35	16	0.01
Detroit, Mich.	0.30	16	0.40	16	0.75	16	0.06
Dodge City, Kans	0.09	24	0.16	24	0.65	24	0.02
Jupiter, Fla.	0.25	13	0.30	17	0.80	17	0.05
New York City	0.25	17	0.30	17	0.35	17	0.05
Philadelphia, Pa.	0.10	15	.....	.....	0.50	26	0.02
Savannah, Ga.	0.30	9 & 27	0.65	27	1.35	27	0.08
San Francisco, Cal*	.....	.....	.....	.....	.....	.....	.....
Saint Louis, Mo†	.....	.....	.....	.....	.....	.....	.....
Washington, D. C.	0.20	10	0.35	10	0.45	14	0.04

*Only 0.03 fell during the month. †Self-register out of order.

This table shows that the greatest rate per minute of precipitation for a five minute period was .08 of an inch at Savannah, Ga., on the 9th and 27th. The rate per minute for this period at the other stations given was, .06 at Detroit, Mich., on the 16th; .05 at Jupiter, Fla., and New York City on the 13th and 17th, respectively; .04 at Washington, D. C., on the 10th, and .03 at Boston, Mass., and Cincinnati, Ohio, on the 5th and 15th, respectively. At Savannah, Ga., a rate of .065 of an inch per minute was maintained for ten minutes on the 27th, and .03 to .04 of an inch per minute fell for ten minute periods at Cincinnati, Ohio, Detroit, Mich., Jupiter, Fla., New York City, and Washington, D. C., on the 15th, 16th, 17th, and 10th, respectively. Savannah, Ga., with a record of 1.35 inch in one hour on the 27th is the only station furnished with a self-registering gauge reporting rainfall to equal or exceed one inch an hour.

SNOW.

The following snowfalls have been reported for June, 1889: Georgetown, Colo., 8.5; Breckenridge, Colo., 6.0; Summit, Cal., 3.0; Alma, Colo., 0.5; Virginia City, Mont., and Cheyenne, Wyo., trace.

Laramie City, Albany Co., Wyo., 13th: snow fell all night and continued into the forenoon. Between Lookout, this county, and Rawlins, Carbon Co., nearly two feet of snow fell on the level. The snowfall in the mountains was very heavy. A snow storm so late in the season has not occurred in this section for many years.—*Northwestern Live Stock Journal, Cheyenne, Wyo., June* 14.

HAIL.

Descriptions of the more severe hail-storms of the month are given under "Local storms." Hail was reported during the month as follows:

1st, Colo., Pa., Vt. 2d, Kans., Nebr., Tex. 3d, Ariz., Kans., S. C., Tenn., Tex. 4th, Ill., La., Mo., Nev., N. Mex., N. Y. 5th, Ga., Mass., Nev., Tex. 6th, Iowa, Kans., Nebr., Nev. 7th, Ill., Iowa, Kans., Nebr. 8th, Ark., Colo., Ill., Kans., La., Mo., Tex. 9th, Mo., N. Y., Wyo. 10th, Me., Nebr., N. Y. 11th, Ala., Ill., N. Mex., Tenn. 12th, Nev., Tenn. 13th, Minn., Mo., Nev., Ohio. 14th, Kans., N. Y., Tenn., Wis. 15th, Ill., Kans., Md., N. Y., Pa., Tenn. 16th, Ky., N. Y. 17th, Dak., Kans., N. J., N. Y. 18th, Ky. 19th, Ind., Ky., La., Tenn. 20th, Ill., Mo. 21st, N. Y., Utah. 22d, Pa. 23d, Colo., Kans. 24th, Nebr. 25th, Dak., Kans., Minn., Mo. 26th, Iowa, Kans., Minn., Mo. 27th, Iowa, S. C., Tenn. 28th, Ind., Mass., Ohio. 29th, Kans.

THE FLOODS IN THE MIDDLE ATLANTIC STATES FROM MAY 31 TO JUNE 3, 1889.

These floods, which were probably the most destructive occurring within the United States of which we have record, originated within the limits of a barometric disturbance which had its origin to the west of the Mississippi. From the regular telegraphic reports of the Signal Service this storm has been traced from the central Rocky Mountain region to the Ohio Valley, where the disturbance divided on May 30th, the principal area of low pressure passing northward over the Lake region, while a secondary disturbance passed eastward over the Alleghanies in Virginia where it remained until the evening of the 31st. The unusual energy of this storm, developed in its advance over the Mississippi Valley, gave indications that the attending gales would extend from the Gulf coast northward to Lake Superior and along the Atlantic coast, and warnings had been previously issued by this service announcing the approach of these dangerous winds. On the morning of May 30th, when the disturbance was central in the Ohio Valley, the forecast was issued by this service announcing that severe local storms would occur in the middle and south Atlantic states and the Ohio Valley in the following twenty-four hours. The development of the secondary disturbance over Virginia, and its slow movement to the eastward, was attended by conditions favorable to continued heavy rains.

The distribution of pressure over the Atlantic Ocean between the twenty-fifth and fiftieth parallels was such as to occasion south to east winds along and off the coasts of the middle and south Atlantic states, where the normal wind-directions are from south to west. The pressure averaged considerably above the normal for May 30th, 31st, and June 1st, from the Azores westward to the New England coast and the Canadian Maritime provinces, the greatest average departures above the normal for the three days being shown in an area extending from Nova Scotia southeastward to about the thirtieth parallel, where they exceeded .30 of an inch. On the afternoon of the 31st the following announcement was made in the offi-

cial forecast of this service based upon the 8 p. m. report: "For eastern New York, eastern Pennsylvania, New Jersey, and Delaware, threatening weather and rain; cooler; southeasterly winds; destructive floods in the rivers of the Atlantic states. For Maryland and Virginia, rain, followed by clearing weather; variable winds; cooler; destructive floods in the rivers of the middle Atlantic states." These announcements were made in advance of the destructive floods, which were wholly due to the heavy rainfall in the river-sheds east of the Alleghanies; the warning being generally twenty-four hours or more before the occurrence of actual damage. Although the flood at Johnstown was most destructive, both as to life and property, it will be seen from the report of Professor Russell in the May REVIEW that probably not more than $\frac{1}{10}$ of the water that was in this flood came from the heavy rains, but was chiefly due to the breaking of the dam and the overflow of the waters of the reservoir.

Chart v which also accompanies his report exhibits the region visited by these floods, and shows the accuracy of the timely warning issued by this service, which warning, widely distributed through the associated press and by special telegrams, resulted in the saving of a large amount of property, but had full advantage been taken of the forecasts the loss of property would have been much less. The flooded district extended from southern Virginia to central New York.

Referring to the flood in Washington, Mr. Charles Wheatley, of Wheatley & Bros., lumber yard, states: "When we were warned by the Signal Office we put a force of men to work at once and secured everything by heavy ropes and other ways, and I find that we have scarcely lost anything." Many others took advantage of the warnings which were published in the city papers and thereby prevented loss of property.

A detailed statement of the enormous loss of life and property in the flooded districts would require more space than is available in this publication.

The following reports, received from observers in the flooded region, indicate its extent and unusual severity:

"Washington, D. C.: The waters of the Potomac rose higher (June 2d) than ever before known. At about noon the water had risen until the tide-gauges were hidden, and was fully three feet above the 1877 flood mark, and that was fully eleven feet above spring-tide high water. The streets and reservations on the lower levels in the centre of the city and all the wharves and streets along the river front were under water. Toward evening the water began to recede, and on the morning of the 3d the city had resumed something of its usual aspect. The flood caused great damage along the river front and on Rock Creek; the harbor improvements were injured and two spans of the Long Bridge were swept away. Serious, if not irreparable, damage was caused along the length of the Chesapeake and Ohio Canal, which was rendered entirely unnavigable throughout its entire length. Railroad communication with the south and west was cut off for two days. Considerable damage was caused to the machinery plants and material in the Navy Yard."

"Lynchburgh, Va., 1st: in consequence of high water produced by the heavy rains during the last three days, northwest of here as well as in the immediate vicinity of this city, nearly all the industrial establishments suspended operation last night. The flood in James River is unprecedented in height and volume since the great flood of 1870. All the bridges at this place have been swept away and the amount of damage done is very large."

"Harrisburg, Pa., 1st: the disastrous rain which prevailed throughout yesterday and last night ended at 4.40 a. m. to-day, 3.12 inches falling during the night. River rising rapidly, all bridges declared unsafe, travel suspended, and all the lower districts of the city are under water, reaching the second stories of the houses in many places. Losses in this city will amount to at least $1,000,000. All manufactories have stopped operations, and the iron works are under water. The extreme height of the water in the Susquehanna River was reached at 9 p. m., rising in all 27.01 feet, 21.6 inches higher than the great flood of 1865, which was the highest point ever known here."

"Lewisburgh, Pa., 3d: the water in the west branch of the Susquehanna River is four feet above high-water mark of the great flood of 1855. Every bridge on the Susquehanna River from Sunbury, Northumberland Co., to Clearfield, Clearfield Co., has been swept away. At Williamsport, Lycoming Co., from fifty to eighty persons were standing on the bridge at Market street, which spans the Susquehanna River, when it gave away, plunging the people into the water. At Milton, Northumberland Co., the water stood five feet high in the streets. At this place five spans of the railroad bridge were swept away. The gas works, water works, and mills were flooded. The loss will reach $75,000. Every town along the west branch of the Susquehanna River is isolated from every other town and communication is difficult, and between some places impossible."—*New York Tribune, June* 4.

"Elmira, Chemung Co., N. Y.: the water during the night of the 1st–2d was from 12 to 18 inches higher than ever before known. The Erie railway bridge was anchored in its place by two trains of loaded freight cars. The water rose to the cars, which, with the bridge, acted as a dam and forced the water back through the city, on the north side of the Chemung River, where the principal business houses are located. The water covered the streets to a depth of two or three feet, and the basements of the stores were quickly flooded, causing thousands of dollars damage."—*The Oswego, N. Y., Palladium, June* 3.

"Charleston, Kanawha Co., W. Va., 1st: the Big Kanawha River is dangerously high, and this place is in danger of being submerged. The Chesapeake and Ohio railroad bridge has been swept away. Tyrone, Blair Co., Pa., 1st: the Juniata River has overflowed its banks at this place and flooded the southern portion of the city, causing great damage."—*The Oswego, N. Y., Palladium, June* 1.

It has been estimated that the loss of life and property in the string of communities in the direct path of the Johnstown flood is about as follows:

	Life.	Property.
Johnstown and Millville	7,000	$18,000,000
Pennsylvania Railroad	.....	15,000,000
Franklin and East Conemaugh	38	1,200,000
Cambria	1,100	750,000
Woodvale	300	3,500,000
Kernville	600	300,000
Mineral Point	16	100,000
Minersville	8	15,000
Morrellville	1	10,000
Sheridan and Coopersdale	0	75,000
Total	9,063	38,950,000

The probable value of the property destroyed by these floods throughout the entire flooded district has been variously estimated at from $50,000,000 to $60,000,000.

The following extracts from a special report relative to these floods, by Professor Lorin Blodget, of Philadelphia, will be found of interest:

The floods of May 30, 31, *and June* 1, 1889, *in Pennsylvania, Maryland, and Virginia.*

It is undoubtedly proper to treat this flooded district as a whole, and to understand it properly the leading facts should be presented as they occurred on each successive day as fully as possible. In this way the extraordinary character of the storm and the flooding violence of the rainfall in each locality will be best shown.

There was a general storm developed in Kansas and Missouri May 27th, which moved slowly from west-southwest to east-northeast along a line from Kansas to New England, making this transit at a slower rate than usual, however, on and after a partial suspension on the 29th, developing renewed violence in Virginia and Pennsylvania on the 30th of May. This was the beginning of the extreme conditions, the high temperature and dense saturation, and it had been unusually cold both south and north up to the morning of the 30th.

As this saturated condition reached the higher ridges of the Alleghanies on this day, it developed the most excessive rainfall of the century for so large an area, depositing a uniform sheet of from 6 to 8 inches of rainfall during a continuous storm of from twenty-four to fifty-six hours duration. The greatest profusion was on May 31st and during the nights of May 30th–31st on the western border, and May 31st and June 1st on the eastern border. And this rainfall was in sheets or masses rather than in drops, being described as "cloud-bursts" by several observers and many local journals, a characteristic observed at Johnstown and Harrisburg alike, as also at places far south in Virginia and north as far as Smethport, McKean Co., Pa.

The winds were also peculiar, being light and unimportant on the first day (30th May), although generally from the south, southeast, or east. In all the mountain districts the wind continued light and almost falling off to calm at the close of the rain on the night of the 31st; but over all the southern and eastern areas affected by the storm, the southeast winds blew a gale from the first to the last; a large area over which no rain fell in southeastern Pennsylvania, Delaware, and New Jersey, having a southeast gale of twenty to forty miles an hour, and experiencing losses from this gale alone.

On the southern and eastern border the temperature was very high and there were many local storms of violence, especially in Virginia and Maryland. These were partially developed cyclones, but not as complete as those developed on the southeast line of the general storm of January 8–9th, last. The upper current or cloud mass in this case showed the most watery density from the first, and moved at a slow but uniform rate from a few points south of west, wasting as it passed eastward and at no time mingled with the scud borne on the southeast wind beneath.

It was quite remarkable that after the very heavy rainfall, usually an inch an hour for many successive hours, the wind fell off to a calm, and only a slight cooling and very light west wind followed the rain. It is also remarkable that a very small barometric movement attended the storm at the stations where barometers were kept, as unfortunately the interior stations of the State Weather Service were not supplied with barometers. At Pittsburgh the fall was about one-fourth of an inch only; also at Erie, at Harrisburg, and at Philadelphia. The pressure remained little below 30.00 inches throughout, and was scarcely affected by the southeast gales in southern and eastern Pennsylvania. There may have been barometric changes in the central area, having eight inches of rainfall, but there were no instruments there to record them. Further examination will be made to obtain an explanation of this anomaly.

The following events are condensed from all available sources for each successive day of the storm in this latitude:

May 30th: in some parts of western Pennsylvania and West Virginia the local disturbances were in the form of severe and even violent showers on this day. A southeast wind began in the early morning of May 30th at all the stations of the State Weather Service—at New Castle, Mercersburgh (Thiel College), Indiana, Uniontown, and probably at Erie and Pittsburgh, not reporting on this point to the state service. Each station reported the threatening weather, and at Indiana there was rain on the 29th (1.2 inch) and on the 30th a fall of 2 inches. At Pittsburgh 1.5 inch, and at Johnstown 2.4 inches, were reported by an observer on the night of the 30th and morning of the 31st. At Somerset, 2,250 feet elevation, rain fell heavily during the evening and night of the 30th. At the stations next eastward, Charlesville, Hollidaysburgh, McConnellsburgh, and Huntingdon, the same southeast or southerly winds prevailed on the 30th, with a temperature of 70° and over, and rains at intervals after 4 p. m. In all Maryland, Virginia, and central Pennsylvania the day was hot, sultry, and threatening, with often occurring showers late in the afternoon, but otherwise favorable for the exercises of Decoration Day. This occasion fixed the time of rain beginning at nearly all the towns in the southern counties. In the northern and northwestern counties the rainfall was less, although generally threatening late in the day. The floods did not extend beyond Clarion in that direction.

In Clearfield, McKean, and Potter counties, however, the force of the storm was felt, beginning at Grampian Hills, Clearfield Co., at 4.30 p. m., and falling very heavily throughout the night; six inches in the seven hours after 12 p. m., as reported by the station observer there. At Emporium, Cameron Co., rain of two and a half inches after 9 p. m., and at Rimersburgh, Clarion Co., an equally marked flood. Evidently the entire line from southwest to northeast on the western heights of the Alleghanies had a flooding rain on the night of May 30th and morning of 31st. The west branch of the Susquehanna then got its first floods, the rain apparently falling equally over the southern and the northern tributaries of the west branch.

It is quite important to note this uniform development of threatening weather with southeast winds and heavy rain at nightfall along this extended line northward and also southward to the sources of the James River in Virginia. And this was everywhere attended with a development of high temperature not derived from the west.

May 31st: this day was marked by the most excessive and flooding rains all over the central counties of Pennsylvania. There is scarcely an exception to the uniformity of these conditions, and no material change even in the winds, as the following tabulated statements will show. The rainfalls were frequently described as "cloudbursts," and similarly expressive terms are found in the published reports. The duration of the rain is usually given as thirty-six hours. In the western and central parts of the state it ceased at 8 to 9 p. m. of the 31st, but in the eastern portions of the flooded counties it continued through the night to some early hour on June 1st.

There was no record of the quantity falling on the mountains proper, but all the indications point to a total on the more elevated surfaces of at least 8 inches, probably 10 inches on the ridges themselves. Over the whole area west of Harrisburg and from the state line on the south to McKean county on the north, the average fall of 8 inches gives, by a rough calculation, 480,000 tons to the square mile. Assuming this area to be approximately 60 by 200 miles, or 12,000 square miles, the total quantity would be 5,760,000,000 tons.

A violent gale from southeast prevailed over most of the surface of New Jersey during the entire day (May 31st), but there was very little rain, except upon the mountains of the northwestern part of that state. This gale alone is reported to have destroyed much property. It was also felt in most parts of Delaware and on the coast.

The following are the reported hours of beginning and ending of the heavier rainfalls, as reported chiefly at the stations of the Pennsylvania Weather Service:

State and station.	Began.	Ended.	Duration.
West Virginia.			*Hours.*
Charleston	Thursday, 12 m.	Friday, 11 p. m.	36
Piedmont	" a. m.	Saturday, 1 a. m.	
Martinsburgh	" a. m.	Friday	
Virginia.			
Fredericksburgh	" 10 p. m.	Saturday, 8 a. m.	34
Pennsylvania.			
Erie	" 10 p. m.	?	
Newcastle	" 3 p. m.	Friday, 7.30 p. m.	28
Uniontown	" 8.30 p. m.	" 3.30 a. m.	12
Pittsburgh	?	?	
Columbus (Warren)	Thursday, 10 p. m.	?	
Johnstown	?	?	
Somerset			
McConnellsburgh	Thursday, 4 p. m.	Friday, 12 m.	33
Bedford	" 3 p. m.	?	
Altoona	" 3 p. m.	?	
Chambersburgh	" 2 p. m.	Saturday, 3 a. m.	36
Huntingdon	" 4 p. m.	" 2 a. m.	36
Bendersville	" 3.30 p. m.	?	
Gettysburgh	" 3 p. m.	?	
York City	" 7 p. m.	Saturday, 5 a. m.	
Bellefonte	" 5 p. m.	?	
Lewistown	" 4 p. m.	Saturday, 2 a. m.	
Siglerville*	" 3 p. m.	" 1 a. m.	
Yeagerstown*	" 5 p. m.	" 2 a. m.	
Williamsport	" 9 p. m.	?	
Ralston (north of Williamsport)	Friday, 1 a. m.	Saturday, 12 m.	35
Muncie (east of Williamsport)	" 3 a. m.	" 1 p. m.	36
Emporium (Cameron	Thursday, 5 p. m.	Friday, 11.20 p. m.	31
New York.			
Buffalo†	" 8 p. m.	" 8 p. m.	24

*Same vicinity. †1.3 inch.

WINDS.

The prevailing winds during June, 1889, are shown on chart ii by arrows flying with the wind. In New England and the lower lake region the winds were mostly from south to west; in the middle and south Atlantic states, the east and west Gulf states, southerly; in Florida and over the southeastern slope of the Rocky Mountains, south to east; in the Ohio Valley, southeast to southwest; in the upper lake region, extreme northwest, middle-eastern slope of the Rocky Mountains, southern and middle plateau regions, and the middle Pacific coast, variable; on the north Pacific coast, north to west; over the northern plateau region, west to southwest; on the north Pacific coast, westerly.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported as follows: Fort Assinniboine, Mont., 52, sw., 24th; Fort Canby, Wash., 63, s., 27th.

LOCAL STORMS.

Destructive storms were most frequently reported in New York, where they were noted for eight dates; in Kansas for five dates; in Tennessee for four dates; in Dakota for three dates; in Texas, Indian Territory, Nebraska, Illinois, Iowa, Missouri, and Wisconsin for two dates; and in Georgia, Massachusetts, New Hampshire, Vermont, Colorado, New Jersey, Indiana, Pennsylvania, West Virginia, Minnesota, and Ohio for one date. In states and territories other than those named storms of unusual severity have not been reported. The storms reported were noted in the greatest number of states and territories, five, on the 17th and 20th; on the first named date they occurred in Texas, New York, Missouri, Dakota, and New Jersey, and on the 20th in Indian Territory, Kansas, Iowa, Missouri, and Dakota. On the 3d, 5th, 7th, 10th, 11th, and 19th they were reported in three states or territories; in two on the 14th, 15th, 16th, 21st, 26th, 27th, and 28th; and in one on the 8th, 9th, 22d. For dates other than those named no destructive storms have been reported, save those of the beginning of the month in the Middle States, which have been made the subject of a special report.

The following are descriptions of the storms above referred to. These storms generally attended the passage of areas of low pressure traced on chart i and discussed under the heading, "Areas of low pressure:"

3d. *Texas.*—Denton, Denton Co.: a very heavy rain fell in the evening, doing considerable damage to the wheat crop. The heaviest rain covered a district running from the northwestern part of the county in a southeasterly direction. The water gathered in floods and in many places it was higher than ever known before. A very heavy hail accompanied the severest part of the rain. Reports from some parts of this county, especially from Roanoke, are that the hail almost entirely ruined crops of all kinds. Alvord, Wise Co.: a drenching rain and severe hail-storm occurred in the evening. Corn and vegetables were riddled by the hail, and some trees were blown down. Gainesville, Cooke Co.: the heaviest wind and rain-storm of the season visited this section during the evening. Great damage to crops is reported throughout this county, and also in the Chickasaw nation. Between Krum and Justin stations, a few miles south of this city, on the Santa Fé Railroad, nine hundred feet of track were washed away. At Purcell, Ind. T., and points north, the storm was very severe, accompanied by heavy hail which fell in large quantities doing much damage to crops. Grape Vine, Tarrant Co.: a heavy wind, hail, and rain-storm passed over this section at 10 p. m., doing immense damage to crops. Corn and cotton were riddled by the hail, while wheat and oats were blown down. The damage all around is very heavy. Granbury, Hood Co.: the most damaging wind and hail-storm that has ever been experienced at this place occurred in the evening. The storm gathered about one mile northeast of this place, and moved in a southwesterly direction, demolishing gardens and crops in its path. The Christian church, a new structure, was twisted about ninety feet out of its natural position. About fifteen hundred window glasses were broken by hail-stones, the stones being as large as hens' eggs. The path of the storm was about one mile wide. Wichita Falls, Wichita Co.: the rain and hail-storm in the evening was the heaviest known in this county; several houses were unroofed and other damage done. Reports from the surrounding country state that the crop is ruined, while wheat and oats are severely damaged. *The Dallas (Texas) Morning News, June 5.* Mesquite, Dallas Co.: a severe wind, rain, and hail-storm, moving from southwest to northeast, began at 6.15 p. m. The hail-stones were mostly large, some of them being of enormous size; all of them were of a ragged appearance and of an almost infinite variety of shapes. The larger stones having protuberances one inch long. Reports show that the path of the hail-storm was about eight hundred yards wide, and about one mile from the east to the west edge. Its duration was about ten minutes, and the wind and rain-storm lasted about twenty minutes. The hail measured about four inches deep on a level, and about two feet in hollows. At 11 a. m. the following day the hail was about eighteen or twenty inches deep in a field four miles northeast of this place. All crops in the path of the storm were ruined, scarcely a vestige of the corn and cotton crops was left. The wind was very destructive to buildings, some being blown down and others removed from their foundations, but no lives were lost.—*Report of Silas G. Lackey. Indian Territory.*—Fort Sill: a severe thunder-storm, passing from north to south, occurred between 8.10 p. m. and 11.50 p. m. The storm was accompanied by light rain and high wind, the wind reaching a maximum velocity of eighty miles per hour, and causing considerable damage to fences, outbuildings, etc. *Tennessee.*—Gallatin, Sumner Co.: a heavy rain-storm, accompanied by wind and hail, occurred during the day. Within less than twenty minutes nearly one inch of rain fell. The wheat and corn crops were damaged to a considerable extent by hail, and a number of trees were uprooted by the wind.—*The Nashville, Tennessee, Banner, June 4.*

5th. *Georgia.*—Way Cross, Ware Co.: a violent storm, moving from southwest to northeast, occurred during the day about one mile north of this place. Hail-stones as large as goose eggs fell in large quantities. Considerable damage was done to crops, fencing, etc. At one plantation the corn and cotton crops were entirely destroyed.—*The Savannah, Ga., Morning News, June 6.*

6th. *Kansas.*—Dodge City: a light thunder-storm, moving from southeast to northwest, accompanied by rain and large hail, occurred between 5.10 p. m. and 5.45 p. m. The fall of hail at this place was of short duration but some of the hail-stones were as large as hens' eggs. The general shape was spheroidal, the larger ones having knobby protuberances, and when broken in half the sections presented a core resembling half-melted snow, around which were irregular coatings of ice. Reports show that the hail-storm was more severe in the surrounding country, where poultry was killed, window lights broken, and crops damaged. *Nebraska.*—North Platte: a severe thunder-storm began at 7 p. m., accompanied by vivid lightning, heavy rain, high wind, and hail; hail-stones of about two inches in diameter fell. The hail ended at 7.25 p. m., but the rain and thunder continued until 10.50 p. m. The wind attained a velocity of eighty miles per hour for two minutes, and of sixty miles per hour for seven minutes. Several dwellings, stables, barns, telegraph wires, and chimneys were prostrated by the wind. The damage in this city is estimated at $5,000. It is reported that from four to ten miles south of the city hail-stones of unusval size fell, and that the crops in the path of the storm suffered serious injury. The damage to crops is estimated at $2,500.

7th. *Illinois.*—Monmouth, Warren Co.: a whirlwind, high in the air, passed over the southern part of this county in the afternoon accompanied by a severe hailstorm. Many buildings, fences, and trees were destroyed. The country was flooded. Monticello, Piatt Co.: a terrific rain storm visited this county late in the evening and continued until the following day. All streams overflowed. The Sangamon River is out of its banks and rising one foot an hour, sweeping every thing before it. In the bottoms there are hundreds of arces of corn under water, and much will be destroyed.—*The Chicago, Ill. Tribune, June* 9. *Iowa.*—Boone, Boone Co.: the heaviest storm in this section since the flood of 1881 occurred during the night and morning. The creeks and water courses are full, and two slight washouts occurred. During the height of the storm the rain changed to hail for half an hour, which did some damage to crops.—*The Nashville, Tenn., Banner, June* 8. *Kansas.*—Andale, Sedgwick Co.: a hail storm, accompanied by light wind and rain, occurred at 5 p. m. Hailstones measuring from seven to eight inches in circumference fell, causing slight damage to wheat and breaking about one-fourth of the exposed window panes. The track of the storm was about five miles wide and fourteen miles long.—*Report of Leon Fouquet, Postmaster.* Atkin, Graham Co.: a severe storm set in at 5.30 p. m. It approached with a roaring noise which was distinctly heard two or three minutes before it struck this place. Hail fell from its commencement and continued for about ten minutes; most of the hail-stones being as large as a half dollar silver piece, and about one-half or five-eighths inch thick, rounded off at the edges, and every stone examined had a star about the centre, on the flat side, as if struck by a bullet. Crops, houses, barns, and trees in the path of the storm sustained serious damage.—*Report of Mr. Ed. Atkin, C. E.* Wakefield, Clay Co.: a hail-storm, the severest on record, passed over the southern portion of this county at 9.45 p. m. Many hail-stones were over one inch in diameter, and they destroyed crops of all kinds, the damage varying in different localities from 10 to 100 per cent. The rain fell so rapidly that the fields immediately became flooded. Hail in quantities remained in the ravines three days after the storm had passed.—*Report of Wm. P. Cochran to the Kansas State Weather Service.* Wichita, Sedgwick Co.: this section was visited during the day by a very severe storm. The western part of this county and the eastern portion of Kingman county suffered most. The storm swept over an area twenty miles long and five miles wide. The heavy rain was followed by hail which laid low the grain and fruit crops. In Westick county many houses and barns and acres of crops were levelled to the ground. One farmer and his family were killed and many others rendered homeless.—*The Nashville, Tenn., Banner, June* 8.

8th. *Illinois.*—Bloomington, McLean Co.: a disastrous storm passed over this section in the evening and the rain continued until 9 a. m. the following day. The wind and hail did much damage, and on the bottom lands, along the Mackinaw River, the corn has been washed out. At Lilly, Tazewell Co., sixteen miles west of this city, a church was demolished, trees, fences, and buildings badly wrecked, and several box-cars were blown from the track. In Tazewell and Woodford counties, the Lake Erie and Western Railroad track is under water for many miles.—*Chicago, Ill., Journal, June* 8.

9th. *New York.*—Oswego: a thunder-storm set in at 2.30 p. m., accompanied by hail at 2.40 p. m., which lasted about five minutes. Most of the hail-stones were from one-half to three-quarter inch in diameter, and from one-quarter to one-half inch in thickness, and their general shape was similar to that of pebbles most of them had a white nucleus, varying from one-quarter to one-half inch in diameter, surrounded by perfectly clear ice. A few very large stones were found, measuring one-and-a-half inch by one inch; they were of clear ice, very irregular in formation, and resembled the fragments of icicles. The storm moved from southwest to northeast, and ended about 3 p. m. Rain occurred from the beginning to the ending of the storm. Another thunder-storm accompanied by rain, passing from north-northwest to east, occurred between 3.30 p. m. and 4.30 p. m. Rochester: two thunder-storms, about thirty minutes apart, passed over this city during the afternoon. The second storm, which lasted about one hour, was the more severe, and considerable damage was caused by the heavy rain and hail in the southeastern portion of the city and surburban districts. No hail fell at station. The hail-storm, which lasted from five to ten minutes, covered a strip 1,500 feet wide, and the hail-stones were about the size of walnuts, causing much damage to hot house plants, shrubbery, small fruits, etc. Several residences in the city were struck by lightning, but the damage done was small. Turin, Lewis Co.: the worst storm that ever occurred in this section set in at 5 p. m. and lasted a short time. The storm approached as a thick, black, whirling cloud, which almost touched the ground, levelling fences and large trees in its path. A large barn, when struck by the storm, was scattered in fragments, scarcely leaving a whole timber on the place. Much damage resulted to other property. In some places the earth was scooped out as though it had been shoveled. Reports from Leyden, Port Leyden, West Leyden, West Turin, Martinsburgh, Lyonsdale, High Market, Osceola, and Constableville, this county, state that the storm at those places was the most destructive ever known.—*Turin, N. Y., Leader, June* 12.

10th. *Massachusetts.*—Holyoke, Hampden Co.: the storm which occurred between 8 p. m. and 9 p. m. caused extensive washouts in the canal at this place. A bridge across the canal was also wrecked. Loss, $100,000.—*Rochester, N. Y., Herald, June* 12. *New Hampshire.*—Dover, Strafford Co.: the storm which passed over this section during the day was very destructive. At South Bennick the academy was struck by lightning. All of the three hundred and fifty pupils were affected by the electricity, and three were prostrated.—*Rochester, N. Y., Herald, June* 12. *Tennessee.*—Chattanooga: a severe thunder-storm, accompanied by brilliant lightning, began 12.15 p. m. and lasted about twenty minutes. Rain fell from 6.18 p. m. to 6.27 p. m., during which time 0.48 inch was recorded. The wind attained a maximum velocity of thirty-six miles per hour from the northwest at 6.18 p. m. No damage was done in this city, except the uprooting of trees, etc.

11th. *New York.*—New York City: a thunder storm, moving from west to east, began 5.10 p. m. and ended 5.30 p. m.; the storm was accompanied by terrific thunder, brilliant lightning, and high southerly winds. Unusually heavy rain occurred from 5.20 p. m. to 5.26 p. m. during which time 0.25 inch fell. Several houses in Brooklyn were blown down. One house in the eastern part in this city was unroofed and then collapsed, killing two men and wounding several others. *Tennessee.*—Jonesborough, Washington Co.: this section was visited at 3 p. m. by a severe wind, rain, and hail-storm. Reports from the country, three miles north of this place, state that great damage was done by the hail to growing crops. In many places the fruit was beaten off the trees.—*Knoxville, Tenn., Daily Journal, June* 11. *Vermont.*—Saint Albans, Franklin Co.: reports from all over the county show that a large amount of damage was done by the storm of last night. Six bridges were carried away, and the loss to farmers is very heavy.—*Rochester, N. Y., Herald, June* 12.

14th. *Colorado.*—Denver: the rain storm which occurred in the afternoon was the severest known here for the last twenty-four years. In the northern portion of the city the streets and cellars were flooded. The brick-yards suffered great loss, nearly all the new brick being destroyed.—*Denver, Colo., Republican, June* 15. *Tennessee.*—Knoxville: the rainfall in the Tennessee Valley during the past few days has been very heavy, and in some respects almost without precedent. The precipitation has been unusually violent and has caused great damage. Reports state that a big washout occurred near Abingdon, Va., in which a bridge on the Norfolk and Western Railroad and three hundred feet of track were swept away. Between Bridgeport and Newport, on the North Caro-

lina division, a large embankment was torn away by the waters.—*Knoxville, Tenn., Daily Journal, June* 14.

15th. *New York.*—New York City: a severe thunder-storm, passing from southwest to northeast, prevailed in the afternoon and evening. It was accompanied by brilliant lightning, particularly about 4 p. m. Four church-steeples were struck by lightning and partially destroyed. Two dangerous fires were started in Jersey City, damage $40,000.

15–16th. *Kansas.*—La Harpe, Allen Co.: the thunder-storms which occurred on these dates were accompanied by unusually heavy rain, causing the streams to rise higher, in a shorter time, than has been known for years. Railroad and highway bridges, culverts, etc., were carried away by the flood, and much damage was done to the growing crops along the streams.—*Report of Mr. Isaac S. Coe.*

16th. *Indiana.*—Crawfordsville, Montgomery Co.: a destructive storm visited the southeastern portion of this township during the evening. It extended over an area ten miles long and one mile wide, and ended in a regular cloud-burst. The damage to property was great, fences and bridges being washed away and barns torn down. Growing crops were badly damaged.—*Union and Advertiser, Rochester, N. Y., June* 18. *New York.*—Canajoharie, Montgomery Co.: a severe rain and hail-storm occurred in the Mohawk Valley this afternoon. Small washouts are reported at various points along the West Shore Railroad.—*Democrat and Chronicle, Rochester, N. Y., June* 17.

16–17th. *New York.*—Dansville, Livingston Co.: rain began at 8 p. m. 16th, and continued twelve hours, swelling the waters of Canaseraga Creek over its banks, and creating havoc and destruction throughout the valley. Three miles south of here the road is completely obliterated for over a mile. At Cridler's dam the new iron bridge has settled to the bed of the creek. Farms and roads in the vicinity of the creek are inundated. The damage done is great and will be felt severely, as the majority of the farmers had just finished replanting crops that were swept away by the recent flood of May 31st–June 1st.—*Post-Express, Rochester, N. Y., June* 17.

17th. *Missouri.*—Springfield: a thunder-storm, moving from southwest to northeast, occurred between 12.20 p. m. and 1 p. m. The storm was accompanied by excessive rain from 11 a. m. to 11.08 a. m., during which time 0.55 inch fell. *Texas.*—Bonham, Fannin Co.: a storm struck this county in the evening about fifteen miles from this place, travelled in a northeasterly direction, and passed three miles south of this town. Many houses in the country were wrecked, and others twisted and badly damaged. Trees and growing crops in its path were levelled.—*Express, San Antonio, Texas, June* 20.

18th. *Dakota.*—Watertown, Coddington Co.: the heaviest rainfall for years occurred this afternoon. For over two hours the rain poured in torrents, flooding cellars, and causing much damage.—*Denver, Colo., Times, June* 18. *New Jersey.*—Long Branch: during a severe thunder-storm, late in the evening, the spire of the Sea Side chapel was struck by lightning and badly damaged. Trees were blown down and crops injured to a considerable extent throughout the surrounding country.—*Post-Express, Rochester, N. Y., June* 19.

19th. *Indiana.*—La Fayette: a heavy wind storm struck this city in the afternoon, doing considerable damage at the car works and wrecking a number of dwellings. The wind storm was followed by a severe shower of rain. The loss outside of the city is considerable, barns, orchards, wheat, and oats being levelled to the ground.—*Union and Advertiser, Rochester, N. Y., June* 20. *Nebraska.*—Bingham, Sheridan Co.: this section was visited in the evening by a severe thunder-storm, accompanied by large hail. The storm was very destructive forty miles west of this place, where hail-stones of about four inches in diameter fell, causing much damage to crops and property.—*Report of Mr. W. C. Wood.*

19–20th. *Dakota.*—Yankton: a thunder-storm, accompanied by high wind and heavy rain, passed over this city during the night. The wind attained a maximum velocity of fifty-two miles per hour at 1.25 a. m., 20th, and caused some damage to buildings, prostrated fences, etc.

20th. *Indian Territory.*—Guthrie, Oklahoma Co.: a thunder-storm, accompanied by high wind, hail, lightning, and torrents of rain, passed over this place at 6 p. m. The storm struck this city with great violence, unroofing many houses, and moving others from their foundations. Several hundred houses in course of erection suffered serious injury.—*Globe-Democrat, Saint Louis, Mo., June* 21. *Missouri.*—Albany, Gentry Co.: a destructive storm passed over the northwestern portion of this state in the afternoon, demolishing a number of dwellings, school houses, and other property, and killing one child.—*The Daily Gate City, Keokuk, Iowa, June* 22. Parnell, Andrew Co.: this section was visited by a severe wind storm at 1 p. m. The storm demolished out-houses and small buildings, scattering the débris in every direction. Reports show that the storm was very severe about one mile west of this place, where eighteen houses were either blown down or moved from their foundations, and a great many people were seriously injured. The storm moved from northwest to southeast.—*Parnell, Mo., Express, June* 20. *Dakota.*—Vermillion, Clay Co.: a heavy wind storm struck this place during the morning, doing considerable damage. A large residence, the Catholic church, and a building on the fair grounds were totally wrecked, and several houses were moved from their foundations or otherwise damaged.—*Denver, Colo., News, June* 21. *Iowa.*—Sioux City, Woodbury Co.: this city and surrounding region was visited this morning by a damaging rain and wind storm. The pontoon bridge across the Missouri River was blown to pieces, and sixty boats were swept down the stream. Reports from many points in northern Nebraska and southwestern Dakota show that great damage was done by the storm, which covered a wide scope of country.—*The Herald, Rochester, N. Y., June* 21. *Kansas.*—Leavenworth: a severe thunder-storm, accompanied by heavy rain and almost continuous loud claps of thunder, occurred between 4.20 p. m. and 5.30 p. m. Several barns and houses were struck by lightning. Damage estimated at $1,000.

21st. *New York.*—South Canisteo, Steuben Co.: a severe thunder-storm accompanied by heavy rain, and in some places by hail, occurred between 1.35 p. m. and 6.30 p. m. Several persons were prostrated during the storm, which fact the physicians ascribe to the excessive electrical conditions. Heavy rain caused the Canisteo River, above Hornellsville, this county, to rise one foot in three minutes.—*Report of Mr. J. E. Wilson. Pennsylvania.*—Scranton, Lackawanna Co.: a terrific thunder-storm passed over here this evening, doing much damage. Lightning struck and burned several houses and killed one child.—*Democrat and Chronicle, Rochester, N. Y., June* 22.

22d. *West Virginia.*—Clarksburgh, Harrison Co.: a cloud-burst which occurred at Mount Clare, this county, yesterday, was followed this morning by heavy rains. The West Fork and Elk rivers are both overflowing their banks for miles, and heavy damage is being done to property. The track of the Clarksburgh and Weston Railroad is under water and traffic is suspended.—*Chronicle-Telegraph, Pittsburgh, Pa., June* 22.

26th. *Minnesota.*—Rushford, Fillmore Co.: a severe storm occurred between 10 a. m. and 3 p. m. The storm gathered near or over the town of Wiscoy, Winona Co., and passed through Houston county, then due south, curving slightly to the west through Yukatan and the eastern portion of Norway, Fillmore Co. A belt two miles wide and thirty miles long was absolutely laid waste. Trees two feet in diameter were twisted off or uprooted by the wind. For two miles the hail pelted all growing crops and vegetation to the ground. It is reported that hail-stones as large as a man's fist fell. On the Southern Minnesota Railroad about two hundred feet of track was covered with a drift of sand about three feet in depth, and one bridge was partly washed away.—*Rushford, Minn., Star*, 27. *Wisconsin.*—Racine, Racine Co.: an electric storm passed over this city during the night and was the severest

known here for years. Thirteen barns and houses were damaged by lightning, and about one hundred cellars and basements were flooded. Growing crops throughout the country were seriously damaged.—*Union and Advertiser, Rochester, N. Y.*, 28.

27th. *New York.*—Watertown, Jefferson Co.: rain fell in torrents in several parts of this county and northern New York during yesterday and last night. There were no trains on the Cape Vincent branch of the Rome, Watertown, and Ogdensburgh Railroad this morning, on account of a serious washout two miles west of Chaumont. Redwood and Sacket's Harbor, both in this county, are flooded. The midnight freight on the Utica and Black River division of the Rome, Watertown, and Ogdensburgh Railroad, ran into a washout at Redwood last night and was wrecked.—*Union and Advertiser, Rochester, N. Y., June* 27. *Wisconsin.*—Waukesha, Waukesha Co.: a very severe rain and thunder-storm occurred during the night. The rainfall was unusually heavy and caused considerable damage to growing crops.—*Milwaukee, Wis., Journal, June* 27.

28th. *New York.*—Schenectady, Schenectady Co.: during a terrific thunder-storm in the afternoon a cloud-burst occurred over the town of Princetown, about six miles southwest of this city, doing great damage. Acres of crops were washed away and a number of head of stock were drowned. The roads at Rotterdam, an adjoining town, were covered with a foot and a half of water, and many bridges were carried away.—*Union and Advertiser, Rochester, N. Y., June* 29. *Ohio.*—Akron, Summit Co.: between 12.15 p. m. and 1 p. m. this city was deluged by a cloud-burst; two inches of rain fell in forty-five minutes, as indicated by the Buchtel College observatory gauge. The railroad tracks were heaped with earth several feet deep and trains were delayed. At Tallmadge, this county, a large section of the New York, Pennsylvania, and Ohio tracks was washed out, and trains were blockaded. The stores in the lower portion of the city were flooded and the streets were running streams. In South Akron a house floated off its foundation, telegraph poles were shattered by lightning, and reports from the country show that the recent excessive rains caused great damage to crops.—*Pittsburgh, Pa., Post, June* 29.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the various stations; the highest and lowest water for June, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, June, 1889 (*in feet and tenths*).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	22, 23	16.0	12	8.7	7.3
Arkansas River:						
Fort Smith, Ark	22.0	23	14.8	13	5.4	9.4
Little Rock, Ark	23.0	25, 26	16.9	15	7.2	8.7
Missouri River:						
Fort Buford, Dak	.....	19	9.4	1	7.0	2.4
Omaha, Nebr	18.0	12, 21	9.6	2, 3	7.0	2.6
Leavenw'rth, Kans.	20.0	24	11.8	9	7.2	4.6
Kansas City, Mo	21.0	20, 21	12.0	4, 5, 6	9.8	2.2
Mississippi River:						
Saint Paul, Minn	14.5	1	3.5	16	2.2	1.3
La Crosse, Wis	24.0	1	5.8	18, 19	3.9	1.9
Dubuque, Iowa	16.0	1	7.1	26, 27, 28	4.3	2.8
Davenport, Iowa	15.0	1, 2	5.1	28, 29, 30	3.1	2.0
Keokuk, Iowa	14.0	8	6.8	30	3.5	3.3
Saint Louis, Mo	32.0	1	24.4	8	13.7	10.7
Cairo, Ill	40.0	24	34.5	1	20.5	14.0
Memphis, Tenn	34.0	27	27.7	2	14.4	13.3
Vicksburg, Miss	41.0	30	33.4	5	19.2	14.2
New Orleans, La	13.0	30	10.5	1	4.9	5.6
Ohio River:						
Pittsburgh, Pa	22.0	1	24.0	27	5.4	18.6
Parkersburg, W.Va.	38.0	3	23.8	29	7.6	16.2
Cincinnati, Ohio	50.0	6	33.6	1	15.4	18.2
Louisville, Ky	25.0	6, 7	11.8	2	7.7	4.1
Cumberland River:						
Nashville, Tenn	40.0	21	25.9	1	4.8	21.1
Tennessee River:						
Chattanooga, Tenn	33.0	3	12.4	29	3.9	8.5
Monongahela River:						
Pittsburgh, Pa	29.0	1	24.0	27	5.4	18.6
Savannah River:						
Augusta, Ga	32.0	30	14.5	27, 28	6.7	7.8
Willamette River:						
Portland, Oregon	15.0	3.4	8.7	24, 28	5.8	2.9

Tennessee River.—Chattanooga, Tenn.: driftwood in river, 2d to 5th, 16th, 17th, 18th.

Mississippi River.—Keokuk, Iowa: driftwood in river, 8th.

FLOODS.

The destructive floods which occurred in sections of the Middle States at the beginning of the month have been made the subject of a special report in this and the preceding issue of the REVIEW. These floods were the immediate result of the excessive rainfall in those sections of the last two days of May, which found the rivers and streams of the Middle States with high stages of water, and the land of the drainage areas saturated, as a result of the abnormally heavy and persistent rains of the preceding two months, which in the middle Atlantic states averaged 70 per cent. above the normal amount for April and May. The destructive features of the flood at Johnstown, Pa., were due almost entirely to the water liberated by the breaking of the dam on the South Fork.

Tuscola, Douglas Co., Ill., 8th: there is a heavy flood in central Illinois, and streams are higher than ever known before. While the damage to crops in this vicinity is not great, reports from Chrisman and Hume, Edgar Co., and other points along the Indianapolis, Decatur and Springfield Railway, are to the effect that thousands of acres of corn, oats, and wheat are under water. A serious washout occurred on the Chicago and Eastern Illinois Railway at Grape Creek, Vermillion Co., and all freight trains are temporarily abandoned.—*Chicago, Ill., Tribune, June* 9.

Newaygo, Newaygo Co., Mich., 11th: the village of Croton, this county, eight miles from this city, is completely inundated by the back water from the jam of logs in the Muskegon River. The pressure against the piers is so great that the bridge is unsafe, and communication is cut off.—*Union and Advertiser, Rochester, N. Y., June* 11.

Indianapolis, Ind., 11th: although no rain has fallen during the last twenty-four hours, White River and other Indiana streams continue to rise. Thousands of acres of farm land are under water and the damage to crops and property is high in the thousands. Several bridges have been carried away in the southern part of the state. The Vandalia line is transferring its passengers near Plainfield, and trains over other lines west and south are running irregularly. In Owen county 2,500 acres of crops are under water, and in Morgan, Bartholomew, Clay, and Greene counties it is estimated that over 10,000 acres are inundated.—*The Oswego, N. Y., Palladium, June* 11.

Decatur, Macon Co., Ill., 12th: the sudden high water in the Sangamon River has done great damage to bottom land crops, and has broken through four levees and overflowed bottoms for miles.—*The Oswego, N. Y., Palladium, June* 12.

Vincennes, Knox Co., Ind., 15th: the June floods have worked disaster to the farmers of southern Indiana who have crops in the bottom lands. The White River has washed out thousands of acres of corn and wheat, and farmers have been compelled to move their families and live stock to high ground. The damage to southern Indiana and Illinois, along White and Wabash rivers, will amount to many thousands of dollars.—*The Oswego, N. Y., Palladium, June* 15.

Erie, Pa.: the heavy rain which began 3.55 p. m., 16th, ended at 10 a. m. the following day, during which time 3.13 inches of rain fell, causing the streams in this section to rise higher than ever known before. Several washouts occurred

in this city, a large number of cellars were flooded, considerable lumber washed away, and crops on low ground destroyed.

El Dorado, Butler Co., Kans., 17th: extensive rains have caused a flood in the valley of the Walnut. Part of the Missouri Pacific track has been washed away. Iola, Allen Co., 17th: this county has suffered severely from floods in the Neosho River and its tributaries. Crops have been badly damaged. There is a serious washout on the Saint Louis, Wichita, and Western Railroad.—*Buffalo, N. Y., Express*, 18.

HIGH TIDES.

Manatee, Manatee Co., Fla.: the high southeast wind on the 16th and 17th caused the tide to rise higher than it has been since 1848; all wharves on the river were submerged, entailing slight damage.—*Report of Mrs. Mary W. Broberg.*

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were noted at Saint Vincent, Minn., 14th; Parkston, Dak., 15th; and Orono, Me., 20th. The display at Saint Vincent was first observed at about midnight of the 14th, and consisted of an arch extending from azimuth 160° to 205° and to altitude 12°, and had much the appearance of a rainbow, though somewhat broader. The display remained materially unchanged until daybreak of the 15th.

THUNDER-STORMS.

The more severe thunder-storms are described under "Local storms." Thunder-storms were reported in the greatest number of states and territories, thirty-six, on the 15th; in thirty-one on the 14th; in thirty on the 17th; in twenty-eight on the 16th, 20th, and 28th; in twenty-seven on the 29th; in twenty-six on the 21st; in from twenty to twenty-five, inclusive, on the 4th to 6th, 8th to 11th, 13th, 18th, 19th, 26th, 27th, and 30th; in from fifteen to nineteen, inclusive, on the 3d, 7th, 12th, and 25th; in from ten to fourteen, inclusive, on the 22d to 24th; in eight on the 1st; and in seven on the 2d. There were no dates for which thunder-storms were reported in less than seven states and territories.

Thunder-storms were reported on the greatest number of dates, twenty-eight, in Texas; on twenty-five in Kansas; on twenty-three in Florida, Louisiana, Michigan, and Tennessee; on twenty-two in Dakota; on from fifteen to twenty, inclusive, in Alabama, Arizona, Georgia, Illinois, Indiana, Indian Territory, Iowa, Mississippi, Missouri, Nebraska, New York, North Carolina, Ohio, Pennsylvania, South Carolina, and Virginia; on from ten to fourteen, inclusive, in Arkansas, Connecticut, Maine, Minnesota, Nevada, New Jersey, New Mexico, Vermont, Wisconsin, and Wyoming; on from five to nine, inclusive, in California, Colorado, Kentucky, Maryland, Massachusetts, Montana, New Hampshire, Utah, and West Virginia; on from one to four, inclusive, in Delaware, District of Columbia, Idaho, Oregon, and Rhode Island. There was but one state or territory, Washington, in which no thunder-storms were reported.

MISCELLANEOUS PHENOMENA.

FOREST FIRES.

Two Harbors, Lake Co., Minn., 12th: forest fires are raging along the Iron Range Railroad. This city is enveloped in smoke. A strong wind has been blowing all day, and every thing is dry as tinder, which renders the conditions very favorable for the progress of the fires. Ely, Emmet Co., Mich., 12th: the most destructive fires of the season are burning in this section; twelve to fifteen houses have been destroyed, and much damage has been done to railroad property.—*The Palladium, Oswego, N. Y., June* 14.

Superior, Douglas Co., Wis., 13th: a destructive fire is sweeping the forests south and west of here. Already over $500,000 worth of pine has been destroyed. The districts tributary to Nemadji and Saint Louis rivers, in Wisconsin and Minnesota, are suffering terribly. The smoke from the burning districts obscures the sun and renders it difficult for vessels to enter the harbor. A strong wind is blowing from the southwest and several villages are threatened. The fires are raging from Saint Croix to the Northern Pacific Junction.—*Union and Advertiser, Rochester, N. Y., June* 13.

Ellensburgh, Kittitass Co., Wash., 17th: severe forest fires prevail on the east side of the Cascade Mountains. The roar of the flames are heard for miles, and during the night the sky is illuminated with a glow. High wind prevails and the fires are extending.—*Union and Advertiser, Rochester, N. Y., June* 17.

Fort Apache, Ariz., 24th: the heavy rain during the last three days, it is believed, has extinguished the extensive fires which have prevailed near the headwaters of the White Mountain River since the 13th.

Forest fires were also reported as follows: Red Bluff, Cal., 1st, 4th to 7th; Linkville, Oregon, 10th; Fort Klamath, Oregon, 19th to 22d; Los Angeles, Cal., brush fires, 9th.

HALOS.

Solar halos were most frequently reported in Illinois, where they were noted on fifteen days; in Texas on thirteen days; in Washington on twelve days; in Dakota on eleven days; in California, Idaho, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Virginia, on from five to ten days, inclusive; in Alabama, Arizona, Arkansas, Indiana, Indian Territory, Iowa, Louisiana, Maine, Missouri, Nebraska, New Hampshire, and Wisconsin, on from one to four, inclusive. In Colorado, Connecticut, District of Columbia, Florida, Georgia, Kentucky, Mississippi, Montana, New Mexico, Rhode Island, Utah, West Virginia, and Wyoming no solar halos were reported during the month. They were reported in the greatest number of states and territories, fourteen, on the 1st and 3d; in twelve on the 2d; in eleven on the 6th and 17th; in from five to ten, inclusive, on the 4th, 5th, 7th to 9th, 11th, 13th to 16th, 18th, 20th, 24th, 25th, and 29th; and in from one to four, inclusive, on the 10th, 19th, 21st to 23d, 27th, 28th, and 30th. For dates other than those named no solar halos were reported.

Lampasas, Lampasas Co., Tex.: the solar halo observed at noon on the 6th was a remarkably beautiful one; it was very brilliant, and formed a complete circle. All the colors were distinct, the red being next to the sun. The phenomenon lasted about one hour, and the prismatic colors faded some time before the disappearance of the halo. Very light cirrus clouds, seemingly stationary, were evenly distributed in the zenith during the time of the halo, although a moderate southeast wind was blowing below. Rain fell every day during the six days following; that on the sixth day being the heaviest known here for many years, 4.26 inches falling in about twelve hours.—*Report of Dr. C. M. Ramsdell.*

Lunar halos were most frequently reported in South Carolina, where they were noted on eight dates; in Illinois, New Jersey, Ohio, and Tennessee on seven dates; in Dakota and Minnesota on six dates; in Alabama, Arkansas, California, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, North Carolina,

Oregon, Pennsylvania, Texas, Virginia, and Washington, on from one to five dates, respectively. In states and territories other than those named no lunar halos were reported. They were reported in the greatest number of states and territories, thirteen, on the 10th; in twelve on the 8th and 9th; in eleven on the 6th; in from five to ten, inclusive, on the 2d, 3d, 7th, 11th to 13th; and in from one to four, inclusive, on the 1st, 4th, 5th, 14th, 15th, 17th, 18th, 20th, 22d, and 25th. For dates other than those named no lunar halos were reported.

METEORS.

The distribution of meteors by dates was as follows: 1st, Villa City, Fla. 2d, Mount Saint Mary's, Md. 5th, Beverly, N. J. 6th, Queensbury, N. Y. 11th, New Haven, Conn. 18th, Keeler, Cal. 19th, Villa City, Fla.; Vevay, Ind. 22d, Albion, Mich. 26th, Barren Creek Springs, Berlin, Bowie, Fallston, Galena, Pocomoke, Salisbury, Snow Hill, Md.; Weldon, N. C.; Cape Henry, Va. 29th, Quakertown, Pa.; Statesburgh, S. C.

The following are descriptions of the more notable meteoric displays reported: Mount Saint Mary's, Frederick Co., Md.: at 11.35 p. m., local time, 3d, a meteor of great size and brilliancy passed over that portion of the heavens between the constellations Corona Borealis and Centaurus. It was first observed near the star Epsilon Borealis; it disappeared behind dense clouds near the star Alpha Centauri. The time of its passage was five seconds. The size of the nucleus when first observed was about one-fourth the apparent diameter of the full moon. It gradually developed into a tail of about three apparent diameters of the full moon. Its color changed from white to a pale blue and purple. Although at the time of observation the heavens were covered with stratus clouds, through which the stars and Venus were but dimly seen, it shone with all the brilliancy of the full moon.—*Report of Prof. James A. Mitchell, Mount Saint Mary's College Observatory.*

New Haven, Conn.: Messrs. William M. and E. W. Abell report that they observed a bright meteor at 9.30 p. m., 11th. The path of the meteor was noted with reference to the stars in the constellation Leo, and found to be nearly parallel to the elliptic. About midway in its course the nucleus elongated, and an instant later separated in two parts of nearly equal brightness, one chasing the other until both disappeared at a point about 10° above the horizon and a little north of west. Both parts were as bright as Venus at her greatest brilliancy, and were nearly a degree apart when they vanished, the altitude of the rear one being a little less than that of the leader.—*The Morning News, New Haven, Conn., June* 13.

Pocomoke City, Worcester Co., Md.: a large meteor fell to the earth in this vicinity at about 8 p. m., 26th. It appeared to be about the size of a flour barrel, and was accompanied by a heavy rumbling noise resembling thunder. It was also reported from Berlin and Snow Hill, this county, that a meteor was observed throughout this county on the evening of the 26th. A singular feature of the display was that all who saw it imagined that the meteor fell close by.—*Baltimore, Md., American, June* 28.

Bowie, Prince George's Co., Md.: two large meteors lodged within a mile of Springfield, this county; the first 8.30 p. m., and the other 9.10 p. m., 26th.—*Baltimore, Md., Sun, June* 27.

Barren Creek Springs, Wicomico Co., Md.: a meteor moving in an easterly direction was observed at 8.30 p. m., 26th. When nearly in the east it burst in four parts, each part being apparently the size of an egg and appeared like falling sparks. Two explosions were heard at long intervals, sounding like distant thunder, attended by coruscations and a cracking noise.—*Report of Mr. A. E. Ackworth.*

Galena, Kent Co., Md.: a brilliant meteor was observed at 8.20 p. m., 26th, moving from southwest to northeast. It resembled a large skyrocket, and burst when apparently four hundred or five hundred yards above the earth.—*Report of Mr. Henry Parr.*

Fallston, Harford Co., Md.: a meteor was observed at 8.21 p. m., 26th. It appeared to be the size of a large dinner plate, and passed off in a southeasterly direction. The meteor lighted up the sky with a rosy tint for about forty-five seconds.—*Report of Prof. G. G. Curtis.*

MIRAGE.

Mirage were observed at Webster, Dak., on the 1st, 2d, 4th, 11th, 17th, and at Hampton, N. H., on the 17th, 27th, 28th.

SAND STORMS.

Sand storms were reported during the month as follows: Fresno, Cal., 5th, 15th, 22d, 25th, 27th; San Carlos, Ariz., 4th, 11th, 14th; Fort Thomas, Ariz., 21st; Winnemucca, Nev., 4th, 12th, 18th, 22d, 26th, 27th.

DROUGHT.

Savannah, Ga.: the protracted drought in this section was broken by the heavy rain on the 9th.

Boisé City, Idaho, 20th: reports from the surrounding country show that all crops are severely injured by the prevailing drought; no rain, except trace, has fallen since May 18th, and the temperature during the month has been very high. There is not, in most localities, sufficient water for irrigation, because of the light snowfall during the past winter.

Parkston, Hutchinson Co., Dak., 30th: the ground is intensely dry and all vegetation is withering. Such drought has not existed in this section since its settlement.—*Report of Mr. John J. Swartz.*

Spearfish, Lawrence Co., Dak., 30th: the last half of the month has been very hot and dry, and where there was no irrigation, crops of small grain have suffered considerably.—*Report of Mr. J. H. Warren.*

Wolsey, Beadle Co., Dak., 30th: The rainfall for the month is below the average, and vegetation is suffering from drought. *Report of Mr. G. W. Frink.*

Woonsocket, Sanborn Co., Dak., 30th: continued dry weather has materially damaged the wheat and oats crops.—*Report of Mr. L. O. Libbey.*

Helena, Mont., 30th: the month has been unusually dry; this, with the insufficient rain in the spring, has caused the severest drought ever known in this vicinity. The water supply in the city is short, small streams are running dry, the grass on the ranges is dying, the grain fields are in serious condition, and in some places no crops will be harvested. Unless heavy rain falls in July farmers, stockmen, and miners will suffer great hardship.

SUN SPOTS.

Haverford College Observatory, Pa., (observed by Mr. H. V. Gummere):

Date. June, 1889.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Faculæ.	
3, 11 a. m ...	0	0	0	0	0	0	0	0	1	3	Definition poor.
4, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition poor.
5, 10 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition poor, clouds.
6, 9 a. m	0	0	0	0	0	0	0	0	0	0	Definition good.
7, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition very good.
8, 11 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition good, clouds.
10, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition good.
11, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition poor.
13, 4 p. m	0	0	0	0	0	0	0	0	5	24	Definition very good.
15, 4 p. m....	0	0	0	0	0	0	0	0	1	1	Definition poor.
16, 5 p. m	1	9	0	0	0	0	1	9	....	....	Definition very good, large spot.
17, 10 a. m ...	0	1	0	0	0	0	1	10	4	27	Definition good.
18, 9 a. m	0	4	0	0	0	0	1	14	2	5	Definition poor.
20, 11 a. m ...	0	6	0	0	0	0	1	20	1	1	Definition poor.
21, 3 p. m	0	5	0	0	0	0	1	25	....	....	Definition good.
22, 10 a. m ...	0	0	0	0	0	0	1	15	0	0	Definition poor.
23, 11 a. m ...	0	0	0	0	0	0	1	12	....	....	Definition poor.
27, 10 a. m ...	0	0	0	0	0	0	1	2	1	4	Definition very poor.
28, 12 m.....	0	0	1	2	0	0	0	0	....	....	Definition very poor.
29, 12 m.....	1	2	0	0	0	0	1	2	10	28	Definition good.

Mr. John W. James, Riley, McHenry Co., Ill.: none seen

until the 16th, when a very large and eleven small ones were found near east edge. The large one, estimated 31,360 miles in diameter, was on sun's meridian the 21st and disappeared by solar rotation 28th. The group of small spots was very changeable in appearance, nearly all vanished before reaching west edge. None seen after the 28th. Mr. C. E. Buzzell, Leaf River, Ogle Co., Ill.: clouds prevented solar observations 8th, 14th, and 15th. But one disturbance was observed during June, a large spot, followed by prominent faculæ and a group of small variable spots, appeared by rotation on east limb 16th, passed meridian 21st, and west limb 27th. The group advanced perceptibly, while in view, and several spots were "merged." The larger one was about 22,000 miles in diameter, and exhibited but very little variability. While this spot was passing the meridian on the 21st, there was a marked high electrical tension upon all the telegraph and telephone lines. There was also a severe disturbance on the 29th, during the storm which registered a maximum velocity of sixty miles from the east. Mr. M. A. Veeder, Lyons, Wayne Co., N. Y.: June 1st and 2d, numerous groups of faculæ by rotation. This group of faculæ occupied the entire sun's disc alone during the entire transit, disappearing by rotation on the 14th. A very large spot appeared by rotation 5.30 p. m., 15th; this spot was attended by many small ones. It began to divide into two parts on the 25th, and disappeared on the 27th. On the 27th, 28th, 29th, and 30th small groups of faculæ appeared by rotation.

VERIFICATIONS.

FORECAST FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for April, 1889, were made by Captain James Allen, 3d Cavalry, Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, April, 1889.

States.		States.	
Maine	81.2	Tennessee	81.3
New Hampshire	80.0	Kentucky	79.5
Vermont	75.9	Ohio	73.4
Massachusetts	80.9	West Virginia	72.4
Rhode Island	80.5	Indiana	82.0
Connecticut	80.4	Illinois	81.2
Eastern New York	79.9	Lower Michigan	78.7
Western New York	80.1	Upper Michigan	78.1
Eastern Pennsylvania	81.0	Wisconsin	81.9
Western Pennsylvania	78.1	Minnesota	76.1
New Jersey	81.2	Iowa	83.1
Delaware	75.0	Kansas	76.1
Maryland	71.4	Nebraska	77.9
District of Columbia	70.9	Missouri	80.5
Virginia	75.5	Colorado	78.7
North Carolina	75.7	Dakota	77.9
South Carolina	78.4	Southern California*	89.5
Georgia	78.9	Northern California*	84.9
Eastern Florida	87.7	Oregon*	78.8
Western Florida	92.3	Washington Territory*	79.7
Alabama	90.7	*By elements:* Weather	84.0
Mississippi	87.5	Temperature	73.3
Louisiana	87.1	Monthly percentage of weather and temperature combined†	79.7
Texas	81.7		
Arkansas	79.1		

The forecasts for districts east of the Rocky Mountains for May, 1889, were made by Captain H. H. C. Dunwoody, 4th Artillery, Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, May, 1889.

States.		States.	
Maine	74.5	Tennessee	90.3
New Hampshire	73.5	Kentucky	85.4
Vermont	80.8	Ohio	82.5
Massachusetts	83.2	West Virginia	85.5
Rhode Island	83.4	Indiana	80.0
Connecticut	82.9	Illinois	75.5
Eastern New York	79.7	Lower Michigan	79.7
Western New York	83.2	Upper Michigan	73.0
Eastern Pennsylvania	81.6	Wisconsin	73.3
Western Pennsylvania	83.4	Minnesota	79.4
New Jersey	82.6	Iowa	80.4
Delaware	85.2	Kansas	81.9
Maryland	82.7	Nebraska	82.6
District of Columbia	80.4	Missouri	81.0
Virginia	87.0	Colorado	79.9
North Carolina	89.7	Dakota	78.7
South Carolina	94.2	Southern California*	85.5
Georgia	92.8	Northern California*	78.1
Eastern Florida	92.8	Oregon*	83.6
Western Florida	93.9	Washington Territory*	79.7
Alabama	94.5	*By elements:* Weather	86.2
Mississippi	94.3	Temperature	80.0
Louisiana	88.9	Monthly percentage of weather and temperature combined†	83.7
Texas	89.7		
Arkansas	88.4		

The forecasts for districts east of the Rocky Mountains for June, 1889, were made by Assistant Professor H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, June, 1889.

States.		States.	
Maine	74.5	Tennessee	72.0
New Hampshire	73.0	Kentucky	69.9
Vermont	72.1	Ohio	81.1
Massachusetts	77.2	West Virginia	72.1
Rhode Island	72.7	Indiana	77.6
Connecticut	75.1	Illinois	78.6
Eastern New York	71.7	Lower Michigan	76.9
Western New York	73.6	Upper Michigan	69.3
Eastern Pennsylvania	78.5	Wisconsin	77.3
Western Pennsylvania	75.9	Minnesota	76.3
New Jersey	74.7	Iowa	83.7
Delaware	78.2	Kansas	76.9
Maryland	81.1	Nebraska	79.9
District of Columbia	77.2	Missouri	78.1
Virginia	79.3	Colorado	76.9
North Carolina	80.7	Dakota	78.7
South Carolina	75.1	Southern California*	93.3
Georgia	76.4	Northern California*	90.2
Eastern Florida	81.9	Oregon*	88.2
Western Florida	82.1	Washington Territory*	87.7
Alabama	77.5	*By elements:* Weather	80.6
Mississippi	75.3	Temperature	70.6
Louisiana	79.1	Monthly percentage of weather and temperature combined†	76.6
Texas	77.3		
Arkansas	75.4		

*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

NOTE.—Beginning with April 11, 1889, the verifications have been prepared by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams.

CAUTIONARY SIGNALS FOR APRIL, 1889.

Statement showing percentages of justifications of wind signals and cold-wave signals for the month of April, 1889:

Wind signals.—(Ordered by Captain James Allen.) Total number of signals ordered, one hundred and twenty-eight; justified as to velocity, wholly, eighty-seven, partly, ten; justified as to direction, one hundred and twenty. Of the signals ordered, ninety-five were cautionary, of which sixty-two were wholly, and seven partly justified; thirty-three were storm signals, of which twenty-five were wholly, and three partly justified. Number of signals ordered for easterly winds, seventy-seven; justified, sixty-nine. Number of signals ordered for westerly winds, fifty-one; justified, fifty-one. Percentage of justifications, 74.6.

Cold-wave signals.—(Ordered by Assistant Prof. T. Russell.) Total number of signals ordered, seventy-one, of which forty-four were wholly, and three partly justified. Number of severe cold-waves without signals, six. Percentage of justifications, 63.5.

CAUTIONARY SIGNALS FOR MAY, 1889.

Statement showing percentages of justifications of wind signals for the month of May, 1889:

Wind signals.—(Ordered by Captain H. H. C. Dunwoody.) Total number of signals ordered, one hundred and sixteen; justified as to velocity, wholly, eighty-seven, partly, eight;

justified as to direction, one hundred and ten. Of the signals ordered, one hundred and eight were cautionary, of which eighty-two were wholly and six partly justified; eight were storm signals, of which five were wholly and two partly justified. Fifty-eight signals were ordered for easterly winds, of which fifty-seven were justified; fifty-eight were ordered for westerly winds, of which fifty-three were justified. Percentage of justifications, 78.6.

No cold-wave signals were ordered during the month.

CAUTIONARY SIGNALS FOR JUNE, 1889.

Statement showing percentages of justifications of wind signals for the month of June, 1889:

Wind signals.—(Ordered by Assistant Professor H. A. Hazen.) Total number of signals ordered, forty-four; justified as to velocity, wholly, twenty-four, partly, two; justified as to direction, forty-three. All of the signals ordered were cautionary. Twenty-three of the signals were ordered for easterly winds, of which twenty-two were justified, and twenty-one were ordered for westerly winds, of which all were justified. Percentage of justifications, 57.1.

Percentages of local verifications of weather and temperature signals as reported by directors of the various State Weather Services for June, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois	80.6	85.2	New Jersey	60.1	86.6
Kansas	83.4	85.7	New York	79.0	88.0
Kentucky	84.0	90.0	North Carolina	78.9	78.9
Michigan	85.7	83.1	Ohio	82.0	85.0
Minnesota	64.0	75.0	Pennsylvania	76.0	88.0
Nebraska	83.6	91.3	South Carolina	85.5	87.0

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts are republished from reports for June, 1889, of the directors of the various state weather services:

ALABAMA.

The average temperature for the month was 2.5 below the normal. This unusual depression was caused by the remarkably cool season the first few days of June. The thermometer ranged so low that some of the observers in the northern portions of the state reported the occurrence of slight frost.

The precipitation was slightly above the average, 0.29. Rains were frequent in north and west Alabama, while in eastern and southern portions of the state the farms suffered for rain until near the close of the month, when copious showers fell. Nearly one half the month was cloudy and there were few really bright, clear days.

SUMMARY.

Temperature.—Monthly mean, 75.7; highest monthly mean, 85, at Union Springs; lowest monthly mean, 70.2, at Valley Head; maximum, 101, at Wiggins, 18th; minimum, 36, at Valley Head, 1st; range for state, 65; greatest local monthly range, 53, at Wiggins; least local monthly range, 30, at Union Springs.

Precipitation.—Average for the state, 4.82; greatest, 8.91, at Elkmont; least, 1.06, at Citronelle.

Wind.—Prevailing direction, south.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

SUMMARY.

Temperature.—Monthly mean, 74.1; highest monthly mean, 77.4, at Texarkana; lowest monthly mean, 69.8, at Dallas; maximum, 100, at Lead Hill, 19th and 20th; minimum, 42, at Paris, Tex., 1st; range for state, 58; greatest local monthly range, 52, at Paris, Tex.; least local monthly range, 28, at Marshall.

Precipitation.—Average for the state, 5.21; greatest, 9.48; least, 1.54, at Brinkley.—*Prof. John C. Branner, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

SUMMARY.

Temperature.—Monthly mean, 63.0; highest monthly mean, 71.5, at Magnolia; lowest monthly mean, 44.2, at Climax; maximum, 98.0, at Rocky Ford, 25th and 28th; minimum, 8.0, at Breckenridge, 10th; range for state, 90.0.

Precipitation.—Average for the state, 1.76; greatest, 5.10, at Cheyenne Wells; least, 0.14, at T. S. Ranch.—*Prof. F. H. Loud, Colorado Springs, director; T. W. Sherwood, Sergeant, Signal Corps, assistant.*

ILLINOIS.

SUMMARY.

Temperature.—Monthly mean, 67.2; maximum, 97, at Belvidere, 28th; minimum, 36, at Lake Forest, 1st; range for state, 61; mean of maximum, 90.6; mean of minimum, 44.4.

Precipitation—Average for the state, 5.52; greatest monthly, 11.49, at Flora; least monthly, 1.50, at Sycamore.

Wind.—Prevailing direction, southwest.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

The month was cool; the mean temperature is the lowest for more than eighteen years, and it is about 5 below the normal for that period. The maximum occurred nearly everywhere on the 20th or 30th, and the lowest on the 1st.

The average precipitation is slightly above the normal, but the amounts were evenly distributed. All over the state rains were quite frequent, in fact to such an extent as to interfere with farm work.

SUMMARY.

Temperature.—Monthly mean, 67.9; highest monthly mean, 71.9, at Marengo; lowest monthly mean, 63.9, at Columbia City; maximum, 95, at Cannelton, 20th; minimum, 39, at Mauzy, 1st; range for state, 56; greatest local monthly range, 54, at Mauzy; least local monthly range, 38 at Butlerville.

Precipitation.—Average for the state, 4.12; greatest, 7.32, at Delphi; least, 2.60, at Marion.

Wind.—Prevailing direction, southwest.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

IOWA WEATHER CROP BULLETIN SERVICE.

Both temperature and rainfall during the month were below the normal. The cool weather that prevailed during the first part of the month was succeeded by warmer weather, which, with the assistance of frequent and well-distributed showers, has advanced all crops to the standard for this time of the year. Frost occurred in some parts of the state on the 1st, causing considerable damage to tender vegetables, and retarding the growth of corn, but the high temperature during the latter part of the month has caused corn to recover rapidly, and it is now in splendid condition.

SUMMARY.

Temperature.—Monthly mean, 67.7; highest monthly mean, 72.6, at Washington; lowest monthly mean, 64.0, at Cresco; maximum, 98, at Logan, 29th, and at Washington, 30th; minimum, 33, at Wesley, 1st; greatest local monthly range, 62, at Logan; least local monthly range, 25, at Gillet; range for state, 65.

Precipitation.—Average for the state, 4.68; greatest monthly, 9.87, at Logan; least monthly, 1.69, at Bancroft.—*G. M. Chappel, Sergeant, Signal Corps, Des Moines, in charge, Iowa Weather Crop Bulletin Service.*

KANSAS.

SUMMARY.

Temperature.—The mean temperature for the state is 71.2. In the eastern division 71.4, in the central 72.3, and in the western 70. There is a deficiency in temperature, amounting to 3 and upward, in the eastern division, but, diminishing westward, it falls slightly below 3 in the western division. Three cool waves passed over the state during June, centering about the 1st, 11th, and 22d. The range of temperature for the state is 67, being 3 greater than for June, 1887 and 1888. The maximum temperature, 107, is 2 less than June, 1887, and 13 higher than that of June, 1888.

Precipitation.—The average rainfall for the state, 4.01, is 0.05 greater than that of June, 1888, and 0.43 greater than that for June, 1887. The average rainfall in the western division for June, 1887, was 2.47; for 1888, 2.04; and for 1889, 3.35. In the middle division it was 3.59 in 1887, 3.04 in 1888, and 3.90 in 1889. In the eastern division, for June, 1887, it was 4.69; 1888, 5.44; while for 1889 it has dropped to 4.78. As regards the divisions of the state, the rainfall this year has been much more equable, but in each division the range is great. In the eastern division it ranges from 2.00 in the northeastern counties to 9.00 in Bourbon. In the central from less than 2.00 in Republic, Russell, and Rush to 5.00 and over in Mitchell, Osborne, Rooks, and Ellis, and 7.00 and over from Reno eastward. In the western from less than 1.00 in the southern parts of Trego and Gove to over 4.00 in Haskell, 5.00 in Greeley, and 10.00 in Rawlins. The rainfall is deficient from the Missouri River to Mitchell, and from the north line south to Franklin, Coffey, Lyon, and Chase; in Cherokee, Labette, Montgomery, and Chautauqua; and in Meade, Clark, Kiowa, and Pratt; and thence north to Russell, Ellis, Graham, and Sheridan. There is an excess from the southeast part of Reno to the east line of the state, being greatest in Bourbon. An excess occurs in the western and northwestern counties, culminating in Rawlins. A severe hail-storm

occurred on the night of the 7th and 8th in many of the northern counties; in Decatur the hail-stones measured from one to three inches in diameter. In Bourbon, on the 15th, from 9 to 11 a. m., 2.40 of rain fell; the following night 0.50 fell, and on the 16th, from 7 to 9 a. m., 3.70 more fell, making a total of 6.60 in twenty-four consecutive hours. This excessive rainfall caused much damage along the Marmaton River. At the same time a very heavy downpour occurred in the southern parts of Chase and Marion, and northern part of Butler, rapidly raising the Walnut, and doing much damage along its course. In Rooks, near Stockton, on the 8th, 3.00 fell, 2.00 of which fell in an hour and a half.

Wind.—Prevailing direction, south.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

SUMMARY.

Temperature.—The average temperature for the month, as deduced from the tri-daily observations, was 69.5; from the average of the mean maximum and mean minimum temperature, 70.6. These figures indicate a deficiency of about 5 less than the normal. The highest temperature recorded during the month was 99, at McHenry, 20th, and the lowest 38, at Pellville, 1st. The latter day was the coolest of the month. The warmest days were the 20th, 21st, 29th, and 30th. The mean monthly range of temperature was 46.2; the greatest range 56, at Pellville, and the least, 35, at Millersburgh. The month was characterized by a great uniformity in temperature, no excessive daily ranges being recorded.

Precipitation.—The average precipitation for the state was 5.27, which is a little less than 1.00 in excess of the normal. The largest monthly rainfall, 8.19, was recorded at Shelbyville, and the smallest, 1.88, at South Fork. The number of days upon which rain fell was excessive, the average for the month being 13. At Louisville rain fell each day during the period embraced between the 7th and the 21st. Despite the abnormally great amount of precipitation during the past six weeks, there still remained at the central station on June 30th a deficiency of 7.74 since January 1st. This shortage approximates that of the state, it being more marked, however, in the eastern counties.

Wind.—Prevailing direction, southwest.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

The drought of several months duration was effectually broken by heavy rain during the month. From April 1st to June 9th the rains were very light and unevenly distributed, but since the latter date there has been enough, if not too much, to be of greatest benefit to the cane, cotton, and corn. The thermal conditions averaged from 2 to 3 below the normal, and the low temperature of the early part of the month is without parallel in the record for southern Louisiana, 50 and below having been reported at five stations in south-central Louisiana, on the 1st. The rainfall in the northern section averaged an excess of 4.31 for the month; in the southern section the excess was but 1.68.

SUMMARY.

Temperature.—Monthly mean, 77.8; highest monthly mean, 83.5, at Cameron; lowest monthly mean, 74.4, at Cheneyville; maximum, 101, at Cameron, 16th and 19th; minimum, 42, at Cheneyville, 1st; range for state, 59; greatest local monthly range, 50, at Saint Joseph and Cheneyville; least local monthly range, 28, at Port Eads, Abbeville, and Shell Beach; mean daily range, 19.4.

Precipitation.—Average for the state, 7.77; for the northern section, 8.04; southern section, 7.60; greatest local monthly rainfall, 15.51, at Crowley; least local monthly rainfall, 3.43, at Cameron; greatest daily rainfall, 5.90, at Cheneyville, 10th.

Wind.—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The temperature for the month has been below the normal, and this June is the coldest of any on the records of this service. The rainfall has been abundant and the ground is well saturated with moisture, the rainfall being above the average in the lower peninsula.

SUMMARY.

Temperature.—The mean temperature for the month, 60.9, is 5.1 below the normal of fourteen years. The temperature was below the normal in all sections, ranging from 3 in the upper peninsula to 5 in the southern section. The temperature was above the normal on the 16th, 19th, 29th, and 30th; normal on the 14th and 20th, and below on the remaining days. The highest mean daily temperature, 75, occurred on the 30th, when the temperature was 5 above the normal, and the lowest, 45, occurred on the 1st, when the temperature was 16 below the normal. The highest mean daily temperature in the past fourteen Junes, 81, occurred on the 30th, 1878, and the lowest, 45, on the 1st, 1889. The highest mean monthly temperature, 69.5, occurred in 1876, and the lowest, 60.9, occurred in 1889. The maximum temperature for the month, 94, occurred on the 30th, at Evart, and the minimum, 29, on the 1st, at East Tawas. Light frosts were reported at the following stations: 4th, Noble; 6th, Bellaire, Ivan, and Noble; 22d, Fremont; 23d, Bear Lake, Ivan, Lansing, and Roscommon.

Precipitation.—The average rainfall for the month of June, 4.25, is 0.37 above the average of the past thirteen Junes. The rainfall was above the average in the southern peninsula, and below in the upper peninsula. The largest average above the normal, 0.59, occurred in the northern section. The largest amount of rainfall recorded at any one station, 7.36, occurred at Saint Ignace, and the least, 1.24, at Berlin, Saint Clair Co. Rain was recorded in some portion of the state on every day of the month except the 23d, 24th, and 25th. The heaviest rainfall was recorded on the 1st in the upper peninsula, on the 9th in the northern section, on the 15th in the central section, and on the 16th in the southern section.

Wind.—Prevailing directions, southwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

SUMMARY.

Temperature.—Monthly mean, 63.8; highest monthly mean, 65.9, at Saint Vincent and Farmington; lowest monthly mean, 57.8, at Duluth; maximum, 99, at Brainard, 29th; minimum, 30, at Pokegama Falls, 22d; range for state, 69; greatest local monthly range, 62, at Pokegama Falls; least local monthly range, 37, at Duluth; greatest daily range, 43, at Saint Vincent, 3d; least daily range, 3, at Morris, 24th.

Precipitation.—Average for the state, 2.41; greatest, 4.53, at Morris; least, 0.76, at Saint Vincent..

Wind.—Prevailing direction, south. By sections, southerly in the north, and northwest in the south half of the state.—*John Healy, Private, Signal Corps, Saint Paul, in charge.*

MISSISSIPPI.

SUMMARY.

Temperature.—The month was remarkable for the lowest mean temperature recorded in the state for June. The normal was 79.1, and the monthly mean for the state 75.8. The mean temperature gradually rose from 64, on the 1st, to 78, on the 8th; then occurred a fall to 70 in the northern and central parts, on the 12th; a rise followed culminating at 81, between the 17th and 19th. Slight fluctuations above and below 75 continued to the end of the month. The mean temperature was below the normal on twenty-four days. The daily range was about 30 on the 1st, and 5 on the 13th; on the other days its value was usually between 14 and 22. The extreme monthly ranges in the state were 36, at Corinth, 1st, and 104, at Columbus, 17th. The ranges, both diurnal and monthly, were greatest at stations on the eastern side of the state.

Precipitation.—The average number of days on which rain fell was ten, and the average rainfall 6.54, being 2.29 above the normal. The deficiency since January has thus been reduced to 9.41.—*R. B. Fulton, Signal Corps, University, director.*

MISSOURI.

SUMMARY.

Temperature.—The mean temperature for June was 70.4. The highest temperature reported was 100, at Protem, and the lowest, 38, at Steelville. The average of maximum temperatures was 92.6, and the average minimum temperatures 47.5, making an average range of 45.1. The highest temperatures occurred on the 19th, 20th, 28th, 29th, and the lowest on 1st, 9th, 10th.

Precipitation.—The average precipitation, 4.58, is 0.38 below the June normal. The greatest amount of precipitation reported was, 8.80, at Oak Ridge, and the least, 2.48, at Conception and Kirksville. In the state as a whole precipitation occurred on 21 days. The greatest number of days of precipitation in any one place was sixteen days at Cairo, Ill., and the least, 5, at Oak Ridge.—*Prof. Francis E. Nipher, Saint Louis, director; W. H. Hammon, Sergeant, Signal Corps, assistant.*

NEBRASKA.

The mean temperature for the month is slightly below the normal, with but few extremely hot days. The precipitation is above the normal and has been most abundant in those parts of the state which in May had a deficiency.

SUMMARY.

Temperature.—The mean temperature for southeastern Nebraska, 69.0, and the maximum for the state, 104, have not been exceeded in previous years. A slight frost on the 4th was reported at Hay Springs.

Precipitation.—The range of precipitation was exceedingly large, varying from less than 1.00 at Fairbury to over 9.00 at West Point. Last month the maximum precipitation in the state, 7.00, was recorded at Fairbury, and the Elkhorn Valley had nearly the least. The average for the state was nearly 4.00, which is over 1.00 above the normal for June. The number of rainy days has also been large. This makes the prospect for the corn good, although it has been a long time since the ground was thoroughly soaked, and the crops will be dependent upon the due amount of precipitation in July and August.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

NEVADA.

SUMMARY.

Temperature.—The month was attended with fine, clear, pleasant but rather dry weather, particularly in the central and southern counties. There were no general storms during the month, the only atmospheric disturbances being in the shape of thunder and hail-storms in different parts of the state. The mean temperature for the state, 70.0, was slightly above the normal for this month. There were two very warm periods, from the 24th to 26th, and from the 29th to the 30th. The highest temperature for the state, 110.0, was observed at El Dorado Canyon, 30th. Between these two warm periods there was a cold one, from the 27th to the 28th. The lowest temperature reported was 30.5, at Tuscarora, 2d, making the absolute range for the state 79.5.

Precipitation.—The average for the state for this month indicates a deficiency of 0.10. The rainfall was heaviest in Elko and Douglas counties, and the least in Lincoln county. The effect of the drought is again being felt in all sections; farmers and millmen still complain of the scarcity of water in the streams, which are lower now than for several years past.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

June was warm and the amount of rain was not far from the average, being slightly above the normal. The mean temperature exceeded the normal by about 1; the individual readings exceeded 90 near the close of the month, but the 18th and 19th were two very cool days associated with the passage of an anti-cyclonic area. Light frosts were reported in some localities on these dates. There were no excessive rains, but the northern states received more rain than the southern. Local rains were very frequent, and on two days only was no rain reported from some station.

SUMMARY.

Temperature.—Monthly mean, 65.4 (103 stations); highest monthly mean, 71.0, at Birmingham; lowest monthly mean, 55.7, at Eastport; maximum, 98, at Birmingham, 29th; minimum, 28, at Berlin Falls, 28th; range for New England, 70; greatest local monthly range, 62, at Berlin Falls and Stratford; least local monthly range, 29, at Nantucket and Block Island; greatest daily range, 50, at Berlin Falls, 1st; least daily range, 1, at Stratford, 5th.

The average temperature for June for 25 stations, having records for more than ten years, is 65.2; the average for June, 1889, is 66.2, departure, +1.0.

Precipitation.—Average for New England, 3.70 (136 stations); greatest, 8.42, at Manchester, Vt.; least, 1.39, at Brewster.

Wind.—Prevailing direction, southwest.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; L. G. Schultz, Sergeant, Signal Corps, assistant.*

NEW JERSEY.

SUMMARY.

Temperature.—The mean temperature for the month, 69.9, is 1.6 above the average for the month, and 0.9 below the average for the corresponding month of 1888. Highest monthly mean, 74.9, at Readington; lowest monthly mean, 66.0, at Atlantic City; maximum, 92, at Billingsport, 17th and 21st; minimum, 37, at Freehold, 4th; range for state, 55; greatest local monthly range, 51, at Freehold and Gillette; least local monthly range, 30, at Bridgeton and Readington; greatest daily range, 41, at Tenafly, 7th; least daily range, 2, at Newark, Brunswick, and Paterson, 1st and 12th.

Precipitation.—The average for the state, 3.73, is 0.25 below the average for the month, and 1.14 above the average for the corresponding month of 1888; greatest, 6.75, at Lambertville; least, 2.39, at Tenafly.

Wind.—Prevailing direction, southwest.—*Prof. George H. Cook, New Brunswick, director; E. W. McGann, Sergeant, Signal Corps, assistant.*

NEW YORK.

SUMMARY.

Temperature.—The highest temperature, 96, at Utica, 29th, and the lowest, 39, at Middleburgh, 7th. The mean temperature for the state was 63.9; the 30th being the hottest, and the 6th the coldest day. The greatest local range of temperature, 66, at Utica, and the least, 26, at Queensbury; range for the state, 67. The temperature was generally below the normal except at New York City, where it was 0.3; Setauket, 2.3, and White Plains, 0.1 above.

Precipitation.—The average precipitation for the state was 6.70. The rainfall was generally above the average, except at Ardenia, where it was 0.04; New York City, 1.04, and Setauket, 1.07 below. The greatest monthly rainfall was 12.31, at Hess Road Station, and the least was 2.38, at New York City. Average number of rainy days, 14.

Wind.—Prevailing direction, southwest.—*Prof. E. A. Fuertes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

NORTH CAROLINA.

SUMMARY.

Temperature.—Monthly mean, 72.4; highest monthly mean, 79.6, at Southern Pines; lowest monthly mean, 67.2, at Asheville, 1st; maximum, 98, at Southern Pines, 15th; minimum, 37, at Asheville, 1st; monthly range for the state, 61; mean daily range of temperature, 16.4; highest mean daily range, 21.5, at Asheville; lowest mean daily range, 8.0, at Hatteras.

Precipitation.—Average for the state, 6.57; greatest monthly, 11.91, at Hatteras; least monthly, 3.90, at Southern Pines.

Wind.—Prevailing direction, southwest.—*Dr. Herbert B. Battle, Raleigh, director; H. McP. Baldwin, Private, Signal Corps, assistant.*

OHIO.

SUMMARY.

Temperature.—The mean temperature, 66.7, was 2.3 below the average for June. The mean temperature of the northern section was 65.2; of the middle section, 66.6; and of the southern section, 68.4. These means are 2.4, 2.2, and 2.2 below the averages for the sections for June.

The maximum temperature, 92.2, occurred at Georgetown, 29th. This is the lowest maximum temperature for June since 1883. The minimum temperature, 38, occurred at Wapakoneta, Wooster, and Bangorville, 1st, and at Wauseon, 4th. The mean daily range of temperature was 18.6. The greatest daily range being 39.5, at Logan, 9th; the smallest, 4.5, at Westerville, 1st.

Precipitation.—Precipitation was general in all sections on the 4th, 8th, 14th to 19th, 25th to 29th; in the northern and middle sections on the 1st, and in the southern section on the 10th and 11th. Local rains occurred in all sections on the 7th, 9th, 21st; and 30th; in the southern section on the 1st, and in the northern section on the 11th. The following unusually heavy rainfalls were reported: 1.33 in 30 minutes, at Hiram, 27th; 1.92 in 1 hour, at Akron, 28th; and 1.05 in 1 hour and 45 minutes, at Wooster, 30th. The heaviest rainfall in twenty-four hours was 2.54, at Ashland, 30th. Thunder-storms were general in all sections on the 7th, 8th, 9th, 14th, 15th, 16th, 18th, 27th to 30th. The mean rainfall in the northern section was 4.19; in the middle section, 3.79; and in the southern section, 4.42. These means are 0.54, 0.13, and 0.47 above the means for the sections. The mean for the state, 4.13, is 0.38 above the average for June. The deficiency in rainfall for the year to July 1st amounts to 1.12 in the northern section; 4.82 in the middle section; and 6.50 in the southern section. The average deficiency for the state amounts to 4.14.

Wind.—Prevailing direction, southwest.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

PENNSYLVANIA.

SUMMARY.

Temperature.—The mean temperature for the month of June, 1889, was 66.5, which is from 2.0 to 3.0 below the average, and 2.0 below the corresponding month of last year. The means of the maximum and minimum temperatures were 76.4 and 75.0, respectively. Neither extreme high nor low temperatures were noted during the month. The warmest period at most stations was on the 21st, and the coldest on the 2d, 7th, and 24th. Frost occurred in some of the northern border counties on these dates. The highest recorded temperatures were Reading, 95; Carlisle, 93; Pottstown, 91, and York, 91. The lowest were Dyberry, 33; Honesdale, 35, and State College 37.

Precipitation.—The average rainfall for June, 1889, was 5.43, which is an excess of 1.63. The entire month was characterized by frequent and heavy rainfalls. The great and destructive rain-storm of the 30th and 31st of May continued to the morning of June 1st over a great extent of country. On the last-named date, over twenty stations report a fall of from 1.00 to 3.00, making a total for the three days' storm, as follows: Wellsborough, 9.80; McConnellsburgh, 8.99; Grampian Hills, 8.60; Harrisburg, 7.78; Selin's Grove, 7.53; Charlesville, 7.50; Huntingdon, 6.57; Coudersport, 6.33; Philipsburgh, 6.09; Smethport, 6.00; New Bloomfield, 6.14; Emporium, 5.97; Hollidaysburgh. 5.80; Eagle's Mere, 5.53; Altoona, 5.33; Girardville, 4.59; Somerset, 4.43; Myerstown, 3.37. For the month of June one station had rain on 21 days, four stations on 20 days, one station on 19 days, and three stations on 18 days. The average for the state was 15 days. The following stations report the greatest total: Wellsborough, 10.04; Myerstown, 8.66; Reading, 8.21; Girardville, 8.01; Scisholtzville, 7.91; Ottsville, 7.58; Smith's Corner, 7.54; Uniontown, 7.36; Quakertown, 7.13, and Harrisburg, 7.18. The excessive rainfall, and the unusual number of rainy days, marks the month as exceptionally wet. With the exception of the 2d, 23d, and 24th, rain fell on every day in some part of the state.

Wind.—Prevailing directions, west and southwest.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant, in charge.*

SOUTH CAROLINA.

SUMMARY.

Temperature.—Monthly mean, 74.4; normal for the past three years, 76.8; departure, —2.4; highest monthly mean, 78.0, at Blackville; lowest monthly mean, 68.5, at Conway; maximum, 99.0, at Chester, 18th and 21st, at Jacksborough, 19th and 20th, and at Winnsborough, 21st; minimum, 39.0, at Evergreen; range for state, 60.0. In most instances the highest maximum occurred on the 19th and the minimum on the 1st.

Precipitation.—Mean depth for the state, 5.10; average for the past three years, 3.79; departure, +1.31; greatest monthly, 7.84, at Winnsborough; least monthly, 2.29, at Branchville; greatest daily, 2.61, at Timmonsville, 29th; average number of rainy days, 10.3.

Wind.—Prevailing direction, southeast.—*Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.*

TENNESSEE.

The month of June was almost a phenomenal one as regards rainfall and electrical disturbances, although no very severe storms were reported. The month opened with a cold wave, resulting in a light frost in various portions of the state. The percentage of cloudiness was in excess of the normal; this feature, and the continuous rainfall from the 9th to the 21st, inclusive, made it a very unfavorable month for farming operations.

SUMMARY.

Temperature.—Mean temperature, 71.5, is the lowest, together with that of 1886, during the seven years past; highest local monthly mean, 75.9, at Woodstock; lowest local monthly mean, 66.8, at Greeneville; maximum, 95, at Woodstock, 20th; minimum, 37, at Nunnelly, 1st; this was the lowest June minimum during the past seven years, except that of last year, which was 36. The highest temperature was generally recorded on the 10th and 18th in the eastern division, about the 29th and 30th in the middle division, and on the 19th and 20th in the western division. The lowest temperature was recorded throughout the state on the 1st. The daily ranges of temperature were generally less than the normal.

Precipitation.—The average amount of rainfall during the month was 5.53,

which is the greatest June average during the past seven years, except in 1886, when it was 7.24. Of this amount the eastern division received an average of about 5.50, the middle division a little more than 3.75, while the western division received nearly 7.50. The rains were well distributed and fell on twenty-six days in various portions of the state, the 6th, 7th, 23d, and 24th being noted without measurable rain. With a few exceptions there were no heavy rains, the greatest local daily rainfall being at Memphis, 3.98, on the 13th.

Wind.—Prevailing direction, southwest.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

TEXAS.

SUMMARY.

Temperature.—The mean temperature for June over the state was 77.5, which is 3 below the normal for the month for fifteen years. The greatest departure from the normal was over the central portion of the state, where the deficiency was 6, and least in the Panhandle where the deficiency was about 2. The highest temperature reported was 104 at Rio Grande City, 8th; El Paso, 20th, and Pecos City, 22d, and the lowest, 52, at Pecos City, 30th.

Precipitation.—The rainfall for June was in excess over the entire state, but the greatest departure was over that section north of the thirtieth parallel and east of the one hundredth meridian (west from Greenwich) which includes all the agricultural portion of the state. Over this section the amount which fell during the month ranged from 6.00 to 12.00, and averaged 8.45, which is over one hundred per cent. above the normal for the month. The precipitation during this month was thirty-three and one-third per cent. greater than the rainfall in June for any year from and including 1876 to the present date (a period of fourteen years). The lowest which has fallen over this section in June during the same period was 0.50 of an inch in 1881.—*S. O. Young, M. D., Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.*

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, June, 1889.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Alabama.	°	°	°	*Ins.*
Auburn	92	46	76.1	2.71
Bermuda †	92	26?	70.6	1.34
Butler †	95	43	77.8	3.23
Centre †	87	50	74.5	8.82
Citronelle †	100	46	79.4	1.06
Columbiana †	93	60*h*	75.4	6.20
Decatur (1) †	.....	.....	.....	3.12
Decatur (2) †	94	38	75.1	3.35
Elkmont †	96	48	73.1	8.91
Eufaula †	94	46	76.8	3.14
Evergreen †	97	44	77.7	6.24
Fayette C. H. †	90	39	74.4	7.50
Florence	86	45	.....	4.35
Fort Deposit †	96	45	77.4	3.31
Greensborough †	94	46	76.9	3.37
Livingston (1) †	92	45	75.6	6.42
Livingston (2) †	94	42	76.1	4.62
Luverne †	94	45	78.2	2.11
Marion † *e*	94	38	74.6	4.63
Motes †	92	41	75.0	5.93
Mt. Vernon B'ks	97	48	77.7	1.98
New Market †	86	38	72.0	5.49
Opelika †	96	44	77.0	4.34
Pine Apple †	98	40	77.8	0.69
Selma ... †	96	43	79.1	4.75
Talladega	93	42	74.1	7.52
Tuscaloosa	89	43	78.5	5.36
Tuscumbia (1)	89	50	72.8	6.04
Tuscumbia (2) †	90	36	70.3	5.45
Union Springs	96	66	85.0	3.42
Uniontown	95	44	78.7	3.57
Valley Head †	88	36	70.2	5.05
Wiggins *d*	101	48	78.6	4.04
Alaska.				
Killisnoo	74	38	53.7	1.85
Arizona.				
Antelope Valley	.....	.....	.....	0.00
Ash Canyon	.....	.....	.....	0.26
Benson *	100	74	86.0	0.63
Casa Grande *	112	70	89.6	0.00
Cedar Springs	.....	.....	.....	0.47
Curtis	.....	.....	.....	0.04
Flagstaff	100	30	64.3	0.30
Florence	109	57	83.2	.....
Fort Apache	98	42	70.3	0.10
Fort Bowie	94	56	77.4	0.04
Fort Huachuca	95	51	74.6	0.16
Fort Lowell	108	52	81.2	0.45
Fort McDowell	113	54	85.2	0.00
Fort Mojave	113	64	87.8	T.
Fort Verde	104	50	75.7	T.
Globe	99	.....	.....	0.38
Holbrook *	99	42	73.0	0.20
Maricopa *	106	75	88.8	0.00
Mount Huachuca	.....	.....	.....	0.55
New River	100	54	70.7	T.
Pantano *	102	70	83.1	1.14
San Carlos *m*	110	54	84.5	0.06
San Simon *	102	60	79.8	?
Signal *e*	107	60	84.0	0.06
Strawberry	.....	.....	.....	0.20
Teviston	.....	.....	.....	3.80
Texas Hill *	113	72	91.4	0.00
Arizona—Cont'd.				
Tombstone	98	54	77.4	.....
Tucson (1) *	102*f*	.....	.....	0.30
Tucson (2) *	102	50	73.5	0.05
Volunteer Springs	92	28	59.5	0.72
Walnut Grove	.....	.....	.....	T.
Wilcox *	98	65	80.8	0.07
Williams	91	32	61.4	T.
Willow Springs	.....	.....	.....	0.20
Yuma *	105	76	89.3	0.00
Arkansas.				
Arkansas City †	.....	.....	.....	6.28
Brinkley †	.....	50	73.1	1.54
Camden †	.....	.....	.....	4.04
Conway	89	57	73.1	9.48
Dallas †	90	50	69.8	4.60
Dardanelle †	.....	.....	.....	5.85
Dayton †	89	56	73.3	2.76
Devali's Bluff †	96	48	75.5	4.90
El Dorado †	87	47	72.4	7.25
Eureka Springs	95	50	73.1	8.90
Forrest City †	95	50	75.0	6.53
Fulton †	.....	.....	.....	5.95
Heber	.....	14	71.7	2.76
Helena (1) †	.....	.....	.....	7.23
Helena (2) † *e*	94	46	74.5	3.83
Hot Springs	93	44	72.6	9.16
Lead Hill	100	50	74.9	4.70
Little Rock B'ks	91	51	73.6	3.06
Lonoke	94	53	75.2	5.75
Malvern † *e*	95	54	76.6	2.07
Marshall †	88	60	74.6	4.80
Monticello †	94	48	77.0	3.30
Newport (1) †	.....	.....	.....	2.50
Newport (2) †	96	46	73.8	3.75
Osceola †	91	45	70.4	6.20
Ozone †	86	54	70.9	4.05
Pine Bluff †	94	50	76.8	4.99
Prescott † *e*	88	59	74.8	0.49
Russellville †	94	52	74.6	6.40
Stuttgart †	93	49	73.4	8.35
Texarkana †	94	50	77.4	6.28
Washington †	89	47	74.0	6.32
British Columbia.				
New Westminster	84	46	62.0	1.93
California.				
Alcade *	105	65	84.2	0.00
Alcatraz Island	69	50	57.4	T.
Almaden *	90	58	70.0	0.00
American Hill * *j*	93	52	71.4	0.40
Anaheim *	86	60	69.4	0.00
Anderson †	104	60	82.7	1.73
Angel Island	87	51	62.2	0.06
Antioch *	91	53	73.9	T.
Aptos *	85	55	62.5	0.00
Athlone *	93	55	72.7	0.20
Auburn *	106	61	80.1	0.00
Bakersfield *	106	71	88.3	0.00
Barstow	105	56	81.4	0.00
Beaumont *	97	55	72.0	0.00
Benicia Barracks	90	51	66.7	T.
Berendo *	106	68	83.2	0.00
Berkeley	78	51	60.7	0.06
Bishop Creek *	105	70	88.8	0.00

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
California—Cont'd.	°	°	°	*Ins.*
Borden *	109	60	80.0	0.00
Boulder Creek	90	50	67.5	0.00
Brentwood *	94	65	77.5	0.13
Brighton *	100	58	75.8	0.22
Byron *	96	64	78.6	0.12
Cactus *	115	68	91.8	0.00
Caliente *	105	64	82.7	0.00
Calistoga *	98	50	66.9	0.00
Castroville *	71	54	61.2	0.05
Centreville *	93	58	68.9	0.01
Chico *	100	60	82.6	0.42
Cisco *	77	44	63.4	0.47
Colegrove	.....	.....	.....	0.00
Coles *	98	45	68.7	0.10
Colfax *	94	56	75.1	0.25
Colton *	102	60	72.3	0.00
Corning *	108	47	84.6	0.65
Crescent City	.....	.....	.....	0.72
Davisville *	99	58	71.6	0.34
Delano *	105	63	86.8	0.00
Delta *	102	58	77.1	1.07
Downey *	84	60	69.3	0.00
Dunnigan *	91	63	76.2	0.28
Dunsmuir *	106	45	67.6	1.12
Edgewood *	94	51	67.5	0.11
El Dorado *	98	59	80.5	0.12
Elmira *	100	60	73.1	0.15
El Verano *	87	52	64.4	0.17
Emigrant Gap *	84	44	63.9	0.38
Esperanza *	102	60	80.8	0.18
Evergreen	.....	.....	.....	0.01
Farmington *	101	62	76.6	T.
Felton *	95	55	68.0	0.00
Florence *	82	58	68.9	0.00
Folsom *	100	62	77.6	0.23
Fort Bidwell	93	43	68.3	0.78
Fort Gaston	101	36	67.4	0.04
Fort Mason	76	50	60.1	0.02
Fresno *	106	62	86.3	0.00
Fruto *	106	60	84.7	0.40
Galt *	96	62	75.3	0.08
Georgetown †	89	48	69.2	0.25
Gilroy *	92	50	67.1	0.00
Girard *	95	58	75.9	0.00
Glen Ellen *	93	48	64.6	0.16
Goshen *	107	71	90.7	0.00
Grass Valley	.....	.....	.....	0.40
Hollister *	78	50	61.7	0.00
Hornbrook *	106	57	75.8	0.00
Hydesville †	75	40	57.8	0.40
Indio *	108	70	88.7	0.00
Ione *	98	54	73.9	?
Iowa Hill *	93	56	74.3	0.22
Jolon	.....	.....	.....	0.00
Keeler *	95	65	80.1	0.01
Keene *	96	60	76.5	0.00
Kingsburgh *	105	69	85.8	0.00
King City *	105	40	62.7	0.00
Knight's Landing *	95	50	68.3	0.41
La Grange *	106	56	79.6	T.
Lathrop *	100	44	69.2	0.00
Laurel *	91	53	66.1	0.00
Lemoore *	105	64	84.4	0.00
Lewis Creek *	104	64 *e*	84.0	0.05
Livermore *	92	50	64.9	T.
Livingston * *j*	102	58	80.2	0.00
Long Beach *	82	62	68.3	0.00
Los Angeles *	90	58	69.2	0.00
Los Banos *	100	62	76.9	T.
Los Gatos *	92	58	71.1	0.00
Mammoth Tank *	110	67	90.3	0.00
Marysville *	100	60	82.1	0.50
Menlo Park *	85	54	66.4	0.00
Merced *	100	56	78.2	0.00
Modesto *	97	56	75.2	0.00
Mojave *	100	62	82.7	0.00
Montague *	102	64	82.9	0.60
Monterey *	78	59	64.7	0.00
Monterey * (Hotel del Monte)	98	54	65.5	0.00
Mount Hamilton	84	46	67.4	0.05
Napa *	97	56	68.3	0.00
Newark *	86	55	68.9	0.02
Newhall *	95	50	67.7	0.00
Newman *	104	60	80.1	0.00
Niles *	87	56	68.7	0.00
Oakland (1) *	78	55	61.3	0.07
Oakland (2) *	78	54	61.9	0.00
Ontario *	85	60	69.8	0.00
Orland *	105	58	80.1	0.38
Oroville *	96	60	79.0	0.42
Pajaro *	72	56	62.6	0.00
Palmdale	103	59	81.7	.....
Paso Robles *	100	52	67.4	0.00
Petaluma *	89	52	65.3	0.18
Placerville *	95	60	76.2	0.12
Pomona *	92	63	72.0	0.00
Porterville *	110	70	87.9	T.
Presidio of San F	68	47	56.8	0.00
Puente *	92	60	69.9	0.00
Red Bluff *	105	59	82.4	0.62
Redding *	108	55	81.7	0.96
Rocklin *	104	58	78.1	0.25
Rumsey *	112	60	82.0	0.15
Sacramento (1)	90	47	67.8	0.28
Sacramento (2) *	89	56	73.1	0.23
Salinas (1) * *d*	75	51	60.4	0.00
Salinas (2) *	71	54	60.1	0.00
Salton *	113	74	92.5	0.00
Sanger Junction *	109	63	86.4	0.00
San Ardo *	98	54	67.6	0.00
San Diego B'ks	74	57	64.9	0.15
San Fernando *	96	48	67.9	0.00
San Gabriel *	90	60	71.1	0.00
San José *	85	56	66.2	0.04
San Luis Obispo	92	49	64.2	0.00
San Mateo *	79	55	63.9	0.00
San Miguel *	96	55	68.5	0.00
Santa Ana *	88	60	72.1	0.00
Santa Barbara (1)	74	50	62.5	0.13
Santa Barbara (2) *	76	60	66.9	0.00
Santa Clara *	85	52	66.3	0.01
Santa Cruz *	87	55	63.6	0.00
Santa Margarita *	95	50	71.9	0.00
Santa Maria	86	50	67.0	0.05
Santa Monica *	82	60	68.9	0.00
Santa Paula *	82	58	68.4	0.00
Santa Rosa *	88	52	65.4	0.25
Seven Palms *	111	75	93.0	0.00
Shingle Springs *	98	57	74.6	0.00
Sims *	109	55	76.7	2.73
Sisson *	89	50	68.8	0.23
Soledad *	84	50	63.0	0.00
Soquel *	82	60	68.2	.....
South Side *	99	50	69.6	0.00
South Vallejo *	75	50	59.5	0.00
Spadra *	92	56	69.4	0.00
Steeles *	79	48	63.2	.....
Stockton (1) *	92	60	70.9	.....
Summit *	76	38	61.1	0.22
Suisun *	95	58	69.3	0.00
Susanville †	94	51	74.1	1.55
Tehachapi *	94	54	78.3	0.00
Tehama *	102	65	79.6	0.95
Templeton *	98	55	67.8	0.00
Towles *	90	54	73.9	.....
Tracy *	103	62	78.6	0.00
Traver *	102	68	85.8	0.00
Tropico *	88	57	67.9	0.00
Truckee *	90	46	70.5	0.00
Tulare *	105	64	85.3	0.00
Turlock *	103	63	79.6	T.
Vacaville (1) *	98	58	72.5	0.20
Vacaville (2) *	95	60	73.8	0.15
Valley Springs *	99	59	78.9	0.07
Vina *	107	60	80.8	0.50
Volcano Springs *	120	70	92.9	0.00
Walla Walla Creek *	94	39	66.9	0.19
Westley *	99	63	82.0	T.
Wheatland	98	52	73.8	0.32
Whittier *	91	59	71.2	0.00
Williams *	106	60	84.8	0.05
Willow (1)	105	53	78.7	1.30
Willow (2) *	104	47	80.3	0.30
Winters *	103	67	82.6	0.15
Woodland *	98	56	72.1	0.35
Walnut Creek *	98	50	68.1	0.05
Canada.				
McGill Col. Observatory, Montreal.	85	46	64.5	4.73
Colorado.				
Agate	.....	.....	59.2	.....
Alma	72	23	48.8	0.76
Aspen	.....	.....	50.7	.....
Bennet *	112	45	66.2	1.80
Breckenridge	85	8	48.6	1.47
Byers	.....	.....	70.3	.....
Cañon City	94	42	70.0	0.67
Cheyenne Wells	.....	.....	66.0	5.10
Climax	.....	.....	44.2	1.43
Coulter * †	81	28	52.5	1.16
Deer Trail	.....	.....	63.6	.....
Delta * †	.....	54	69.0	0.00
Denver (Jesuit Col)	95	37	65.9	1.30
Durango †	.....	.....	.....	1.30
Eagle Farm	.....	.....	.....	1.13
First View	.....	.....	65.8	2.92
Fort Collins	90	35	62.3	2.16
Fort Crawford	99	33	65.2	0.38
Fort Lewis	82	30	59.1	0.60
Fort Logan	96	43	65.8	1.05
Fort Lyon	102	39	69.0	1.41
Fraser *	74	34	54.8	1.26
Georgetown	78	24	53.9	1.50
Grand Lake *	86	33	53.5	1.38
Greeley	92	30	66.4	3.12
Gunnison	.....	.....	55.8	0.16
Hugo	.....	.....	68.8	.....
Husted	94	33	61.6	1.63
Idaho Springs	.....	30	56.8	1.28
Julesburg	94	43	66.6	3.90
Kit Carson	.....	.....	65.9	.....
Lamar	.....	.....	.....	2.56
Leadville	72	19	48.0	0.66
Livermore	.....	.....	.....	4.08
Longmont †	96	36	62.3	1.68
Magnolia	.....	.....	71.5	.....
Monte Vista	91	23	56.2	0.62
Palmer Lake	.....	16	.....	2.57
Paoli	.....	.....	67.1	3.50

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Colorado—Cont'd.	°	°	°	*Ins.*
Rifle Falls	.....	.....	59.9	0.31
River Bend	.....	.....	70.4	.....
Rocky Ford	98	47*	72.2	0.75
San Luis Ex. Sta	.....	.....	59.2	0.51
Sun View	.....	.....	64.6	.....
T. S. Ranch	95	40	70.2	0.14
Thon	88	33	60.6	1.81
Connecticut.				
Birmingham	98	47	71.0	4.00
Canton	91	37	.....	3.27
Clark's Falls	.....	.....	.....	4.20
Colchester	84	44	65.8	.....
Falls Village	.....	.....	.....	4.31
Fort Trumbull	88	44	68.6	2.80
Hartford (1)	91	46	66.5	3.13
Hartford (2)	.....	.....	.....	3.69
Lake Konomoc	.....	.....	.....	3.47
Mansfield	86	41	65.2	3.50
Middletown	88	42	67.0	3.34
New Britain	.....	.....	.....	4.63
New Hartford (1)*	92	45	67.0	4.09
New Hartford (2)	.....	.....	.....	4.91
Newington	.....	.....	.....	1.77
North Woodstock	.....	.....	.....	2.94
Pomfret	.....	.....	.....	2.14
Shelton	87	42	67.7	2.87
South Manchester	.....	.....	.....	3.61
South Woodstock	.....	.....	.....	3.94
Thompson*	87	45	66.8	.....
Voluntown*	86	53	67.1	2.76
Wallingford	.....	.....	.....	4.06
Waterbury	90	38	68.4	4.09
West Simsbury	.....	.....	.....	3.20
Dakota.				
Alexandria†	98	53*	66.8	1.52
Armour*	98	47	67.6	3.10
Brookings	94	36	64.1	1.48
Carrington†	97	40	65.4	1.92
Davenport	92	36	65.2	0.84
De Smet †*	....	54	66.0	1.20
Fort A. Lincoln	98	42	65.3	2.08
Fort Bennett	100	42	69.0	1.56
Fort Buford	104	37	65.6	1.03
Fort Meade	94	42	62.6	1.60
Fort Pembina	96	35	64.0	1.42
Fort Randall	99	45	70.8	1.43
Fort Sully	99	45	69.6	1.54
Fort Totten	95	42	65.5	1.56
Fort Yates	100	39	64.5	1.21
Gallatin*	100	40	65.8	.....
Kimball†	99*	41	67.6	0.72
Napoleon†	98	50	64.9	1.43
New England City†	104	34	64.2	0.94
Onida*	99	40	64.8	1.52
Parkston*	94	40	64.8	2.64
Redfield †*j*	100	41	64.6	1.50
Roscoe †*g*	103	39	64.8	0.80
Spearfish *†	101	48	68.7	1.45
Spring Lake*	92	32	65.7	8.00
Steele †	99	38	64.6	1.28
Webster†	94	35	66.3	7.07
Wolsey *	97	38	67.3	0.70
Woonsocket	99	39	67.4	1.57
Delaware.				
Kirkwood*	.....	60	72.0	.....
District of Columbia.				
Washington B'ks	93	51	72.1	6.36
Florida.				
Altamonte Springs†	94	58	78.8	9.10
Alva†	99	53	78.1	11.81
Archer*†	96	58	78.1	9.18
Fort Barrancas	91	50	78.3	5.03
Fort Meade*	91	58	77.4	9.71
Homeland *	95	62	81.4	6.55
Kissimmee City	96	57	80.7	7.74
Live Oak†	96	50	79.4	10.12
Manatee†	93	64	80.4	11.10
Matanzas*	92	62	78.0	8.15
Merritt's Island†	92	65	75.4	14.28
St. Francis B'ks	93	56	77.0	9.30
Tallahassee†	92	50	77.3	5.83
Villa City †*	94	65	78.3	11.26
Georgia.				
Albany†	98	50	80.0	3.39
Aliapaha†	96	46	78.0	3.11
Andersonville†	99	56	76.1	2.00
Athens (1)	87	44	73.6	5.37
Athens (2)†	98	44	77.4	6.54
Bainbridge†	98	48	78.6	3.02
Camak†	94	44	76.8	5.67
Cartersville†	93	41	74.2	6.98
Columbus†	92	56	71.4	6.09
Diamond*	.....	48	68.9	11.88
Duck†	84	41	67.8	4.80
Eastman†	98	54	80.0	1.18
Forsyth*	91	52	77.0	7.94
Fort Gaines†	98	48	79.8	0.83
Gainesville†	84	42	71.0	2.65
Griffin†	96	44	75.9	3.82
Hephzibah*	88	54	77.8	0.82
Jesup†	98	47	78.4	4.50
Macon†	94	44	74.4	2.82
Marietta†	87	43	70.9	7.41
Milledgeville†	93	46	76.2	2.45
Millen†	100	46	77.8	5.17
Georgia—Cont'd.				
Newnan†	96	44	75.6	7.59
Point Peter*	.....	48	76.0	4.80
Quitman†	98	50	78.8	2.53
Smithville†	98	46	79.0	2.35
Thomasville (1)	96	48	77.6	2.84
Thomasville (2)†	98	48	78.0	3.83
Toccoa†	90	42	72.4	2.76
Union Point†	94	48	75.8	3.21
Washington†	92	45	74.6	2.03
Way Cross†	92	50	77.1	7.72
Waynesborough†	91	48	76.3	3.09
West Point†	94	51	79.1	3.32
Woolley's Ford*	86	48	71.3	.....
Idaho.				
Boisé Barracks	98	43	69.2	0.14
Fort Sherman	90	40	63.8	0.76
Lewiston	99	58	73.5	0.90
Soda Springs†	89	24	58.4	0.17
Illinois.				
Aledo	94	44	.....	5.35
Atwood	86	42	62.2	10.17
Aurora	88	42	65.1	4.38
Beardstown†	.....	.....	.....	7.57
Beason	90	43	65.4	7.07
Belvidere	97	48	64.6	2.34
Brush Hill	96	50	69.6	9.32
Cedarville	88	37	64.7	1.65
Centralia	95	50	69.0	7.07
Collinsville	93	46	69.6	3.66
Dwight	90	41	67.1	6.34
Fairfield	92	50	72.2	5.75
Flora	92	41	68.0	11.49
Fort Sheridan	86	39	59.1	4.10
Golconda	92	51	70.6	7.27
Grand Tower†	.....	.....	.....	4.55
Greenville	92	44	68.0	4.43
Griggsville	94	59	72.3	4.93
Hennepin	91	40	66.0	5.72
Hillsborough	90	46	70.8	.....
Irishtown	92	51	70.4	6.41
Jordans Grove	92	50	69.9	8.11
Lacon	87	46	65.6	4.93
Lake Forest	84	36	60.4	4.21
Lanark	85	44	64.8	3.17
Louisville	.....	.....	.....	6.20
Martinsville	92	45	68.5	7.65
Mascoutah	94	46	.....	5.00
Mattoon*	95	44	67.8	6.30
Mount Carmel†	.....	.....	.....	4.72
Mount Morris	91	46	66.2	2.30
Olney	93	47	68.7	5.71
Oneida	92	40	68.5	4.13
Oswego	90	46	65.0	4.98
Ottawa	90	47	67.9	4.61
Palestine†	90	44	68.6	5.50
Pana	93	52	70.4	4.68
Pekin	90	41	69.2	7.70
Peoria (1)	92	46	69.9	6.30
Peoria (2)†	.....	.....	.....	6.60
Philo*	96	44	68.1	11.16
Pontiac	90	42	65.7	2.45
Quincy	93	.....	70.2	3.48
Richview	92	44	68.8	10.04
Riley *	84	42	63.1	3.25
Rockford	86	42	63.6	3.93
Rock Island Ars'l	86	36	65.4	4.93
Sandwich *	90	50	68.6	5.40
South Evanston	88	38	.....	4.45
Sycamore*	85	39	63.9	1.50
Warsaw †	.....	.....	.....	1.70
Watseka	91	40	66.3	5.65
Wheaton	86	44	62.3	.....
White Hall	90	40	69.0	3.87
Willow Hill	86	46	68.0	5.85
Windsor †	89	39	67.9	6.53
Winnebago	92	45	67.3	3.20
Woodstock	82	37	59.1	4.40
Indiana.				
Angola	92	43	68.5	3.50
Blue Lick	89	44	69.0	4.22
Butlerville*	.....	46	70.5	3.71
Cannelton	95	44	69.5	4.25
Columbia City	92	40	63.9	3.79
Columbus	90	45	68.5	4.38
Connersville	86	40	67.7	3.76
Dana*	92	44	67.6	5.31
De Gonia Springs	88	47	69.7	4.49
Evansville†	.....	.....	.....	5.05
Farmland	87	42	67.4	5.59
Franklin	90	46	68.3	6.00
Huntertown*	85	46	68.0	4.25
Huntingburgh	90	49	71.8	3.62
Huntington†	.....	.....	.....	4.37
Jeffersonville	92	46	71.2	4.94
Laconia*	98	45	71.0	6.45
La Fayette	89	40	66.2	4.14
Logansport†	.....	.....	.....	4.79
Marengo	91	48	71.9	6.52
Marion	87	42	66.0	2.60
Mauzy*	.....	43	68.8	5.19
Mount Vernon(1)†	.....	.....	.....	4.80
Mount Vernon(2)	93	47	70.2	4.80
Muncie	92	42	68.5	.....
New Providence	94	41	70.4	3.91
Point Isabel*	94	43	67.6	4.05

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Indiana—Cont'd.	°	°	°	*Ins.*
Princeton	91	46	70.7	3.60
Richmond	87	44	63.0	3.74
Rockville	92	42	67.0	5.00
Rushville†	.....	.....	.....	5.03
Scalesville	91	44	71.7	4.94
Seymour	88	46	67.7	4.61
Shelbyville	.....	.....	.....	5.10
Spiceland	93	41	68.4	4.70
Sunman †	90	40	66.2	5.96
Vevay	92	44	70.2	4.46
Vincennes †	.....	.....	.....	6.76
Worthington	86	46	67.8	7.32
Indian Territory.				
Caddo Creek *e	91	62	75.5	.....
Cantonment †	.....	.....	.....	2.97
Eufaula†	.....	.....	.....	4.83
Fort Gibson	94	47	73.3	2.43
Fort Reno	92	50	72.5	6.55
Fort Sill	96	53	73.8	4.25
Fort Supply	97	50	73.7	2.90
Guthrie*	96	56	75.0	9.94
Jimtown†*	.....	61	74.4	6.15
Lehigh*	.....	60	71.6	.....
Oklahoma City † *h*	93	50	72.4	3.39
Tulsa†	.....	.....	.....	2.20
Woodward†	.....	.....	.....	3.00
Iowa.				
Amana†	89	41	66.6	5.07
Ames *	89	48	67.4	4.90
Bancroft *	93	48	68.7	1.69
Blakeville *	95	48	64.6	5.99
Cedar Rapids	90	35	65.4	4.11
Clarinda *	92	48	69.6	4.15
Clinton	94	43	67.3	4.94
Cresco	87	35	63.0	4.91
Cromwell*	.....	43	67.2	3.00
Denmark	.....	.....	.....	5.95
Des Moines	90	36	67.9	.....
Dunkerton*	94*d*	56*h*	66.9*f*	7.60
Dysart*	86	45	64.4	5.45
Eagle Grove *	90	49	69.6	5.75
Elkader *	90	43	67.8	3.90
Fayette†	88	38	63.7	5.10
Fort Madison*	94	50	75.7	4.49
Gillett†	.....	53*	65.0	4.86
Glenwood (1)	95	40	72.0	3.36
Glenwood (2) *	96	36	65.6	3.74
Grinnell	87	39	66.6	3.94
Hampton	90	35	63.6	4.36
Independence*	84	48	66.8	4.83
Iowa City	88	47	68.1	3.85
Le Claire†	.....	.....	.....	4.47
Logan †	98*	36	70.7	9.87
Manson*	92	42	68.6	8.12
Maquoketa*	90	48	66.7	3.47
Monticello	90	40	66.8	4.89
Mount Pleasant*†	87	52	69.7	4.66
Mount Vernon *	92	50	69.6	5.15
Muscatine (1)	.....	.....	.....	4.84
Muscatine (2)*†	91	45	66.9	5.68
Osage	.....	.....	.....	2.68
Oskaloosa (1) *	90	49	69.0	4.75
Oskaloosa (2)	94	40	69.8	5.05
Sac City *	88	43	65.4	7.73
Sioux City	.....	.....	.....	4.45
Vinton *	86	47	65.6	4.31
Washington	98	47	72.6	5.26
Webster City *	92	42	66.5	4.61
Wesley †	91	33	63.6	2.15
Kansas.				
Abilene	91	.....	.....	2.57
Allison*	.....	52	68.6	2.95
Arlington	.....	.....	.....	5.22
Atwood	.....	.....	.....	10.03
Augusta *	96	56	73.6	6.67
Belleville*	90	.....	.....	1.98
Bendena *	.....	61	76.6	1.44
Brookville*	107	60	79.0	4.70
Bucklin	.....	.....	.....	2.15
Buffalo Park *	98	54	73.1	2.81
Bunker Hill *	100	54	.....	1.67
Burr Oak *	96	44	71.2	3.38
Cawker City *	92	54	72.8	5.70
Colby	96	42	66.8	4.33
Cold Water *	.....	.....	.....	4.75
Collyer *	104	52	71.1	2.12
Conway *	92	52	72.4	5.20
Cunningham *	95	48	69.8	4.54
Dorrance *	102	50	.....	1.68
Dwight	.....	.....	.....	3.32
Elco *	94	50	72.4	7.70
Elk Falls †	95	55	73.9	3.50
Ellis (1)	.....	.....	.....	6.45
Ellis (2)*	94	58	73.6	6.35
Ellsworth *	96	56	77.7	2.50
Emporia	92	49	70.9	4.35
Englewood *	102	56	73.8	2.70
Fort Hays	93	44	69.3	4.22
Ft. Leavenworth(1)	92	45	71.2	3.09
Ft. Leavenworth(2)	92	49	70.7	2.55
Fort Riley	94	50	72.5	1.52
Fort Scott	.....	.....	.....	9.00
Fremont†	98	40	68.8	4.21
Gibson	100	50	66.4	0.49
Globe *	90	56	71.4	3.48
Kansas—Cont'd.				
Gorham*	96	55	.....	1.82
Grainfield*	90	48	64.8	4.75
Grenola*	96	57	72.4	6.75
Grinnell *	102	50	74.6	3.75
Halstead	92	51	71.2	6.71
Haven	.....	.....	.....	7.25
Havensville *	96	53	71.0	4.00
Hays City*	96	57	.....	2.45
Horton*	92	56	.....	2.79
Hutchinson	.....	.....	.....	3.00
Independence *	92	56	70.8	4.03
Junction City	.....	.....	.....	2.47
Kanopolis *	96	60	.....	4.50
Kirwin†	.....	.....	.....	2.06
La Harpe*	.....	58	70.4	6.19
Lawrence	90	52	71.2	4.04
Lebo	94	48	68.6	5.40
Lisbon*	100	56	74.0	0.86
Luray	.....	.....	.....	3.25
Macksville*	97	42	69.9	1.50
Manhattan (1)*	97	41	70.3	3.56
Manhattan (2)†	.....	.....	.....	4.01
Manhattan (3)*	96	54	72.4	3.54
Marmaton	98	67	.....	8.85
McAllaster *	98	50	71.6	5.27
Minneapolis	96	53	.....	2.87
Monument*	98	48	.....	2.80
Morse*	90	50	67.2	4.60
Ness City*	.....	.....	.....	1.50
Oakley *	98	50	.....	4.35
Oberlin †	.....	.....	.....	3.22
Offerle *	93	52	69.9	2.47
Ogallah *	95	55	.....	2.90
Quinter*	94	53	70.0	2.81
Rago *g*	.....	65	79.4	2.75
Rome*	94	50	71.0	6.18
Russell *	91	53	71.5	1.50
Salina *	96	54	73.7	2.75
Santa Fé †	.....	.....	.....	4.10
Sedan	99	52	72.0	4.44
Seneca	91	56	71.5	4.06
Shields	.....	.....	.....	1.46
Stockton	.....	.....	.....	5.54
Tribune†	99	43	69.4	5.26
Vesper*	.....	.....	.....	3.45
Victoria*	95	55	73.1	1.77
Wakefield *	98	58	73.6	3.14
Wa Keeney *	92	54	.....	.....
Walker*	98	56	.....	.....
Wallace†	.....	.....	.....	3.40
Walnut Grove *	86	52	70.8	2.70
Wellington	92	53	65.8	5.57
Weskan*	105	40	69.7	2.30
Wilson *	94	55	.....	1.15
Winfield	.....	.....	.....	5.63
Winona*	94	44	.....	3.95
Yates Center	89*	49	69.4	5.69
Kentucky.				
Ashland †*	.....	47	65.0	4.03
Bernstadt †*	86	48	69.0	5.21
Bowling Green †	93	43	73.8	6.04
Burnside †	.....	.....	.....	4.83
Catlettsburgh†	.....	.....	.....	4.69
Eddyville†	.....	.....	.....	6.56
Falmouth (1)† *	88	47	67.7	7.15
Falmouth (2)†	.....	.....	.....	6.81
Frankfort (1)	93	43	69.4	4.82
Frankfort (2)†	.....	.....	.....	4.71
Franklin † *	87	56	71.4	5.36
Greensburgh†	.....	.....	.....	3.83
Louisa †	.....	.....	.....	4.15
Madisonville † *	92	51	71.1	4.88
McHenry*† *d*	99	52	70.7	7.39
Millersburgh *†	85	40	68.8	.....
Mount Sterling †*	87	46	66.6	7.70
Newport Barracks	91	43	69.6	4.56
Owenton†	90	42	70.5	3.64
Paducah†	.....	.....	.....	5.19
Pellville†	94	38	69.7	5.37
Richmond †	97	42	71.8	3.40
Shelbyville *	92	41	69.6	8.04
South Fork †*	86	48	68.7	1.86
Springfield	.....	.....	.....	5.20
Williamsburgh †	.....	.....	.....	3.00
Louisiana.				
Abbeville	88	60	79.1	8.81
Alexandria†	94	45	75.6	14.58
Amite City †	92	60	76.2	8.16
Baton Rouge	90	.....	79.2	5.07
Cameron†	101	53	81.2	3.43
Cheneyville†	92	42	74.4	10.19
Clinton	98	57	77.6	8.84
Convent	95	50	76.0	10.95
Coushatta (1)†	.....	.....	.....	6.83
Coushatta (2)†	96	50	77.8	6.42
Crowley	92	51	78.2	15.51
Delhi †	.....	.....	.....	5.40
Donaldsonville	.....	52	.....	5.17
Farmerville	93	47	76.8	4.75
Franklinton	94	45	77.7	4.16
Girard †	.....	.....	.....	6.30
Grand Cane	92	56	77.8	6.10
Grand Coteau	90	50	78.3	4.90
Houma †	93	51	78.1	8.16
Jackson Barracks	93	63	78.6	4.49

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Louisiana—Cont'd.	°	°	°	*Ins.*
Jeanerette	87	56	76.3	9.35
Jennings	97	53	79.8	?1.01
La Fayette †	93	53	79.2	12.40
Lake Charles	100	55	79.7	7.80
Lake Providence	98	50	77.0	13.88
Liberty Hill	96	47	77.5	10.35
Luling *e*	91	45	70.2	5.53
Mandeville	94	48	78.1	4.08
Marksville †	93	47	77.7	10.33
Maurepas	93	49	76.5	8.65
Melville	94	52	77.7	5.43
Minden †	92	52	77.6	4.09
Monroe †	94	46	76.7	7.98
Mount Airy	95	56	79.0	6.04
Natchitoches †	96	52	77.2	9.87
New Iberia	90	55	78.4	8.64
Plaquemine	93	48	76.5	5.83
Point à la Hache † *	.....	68	79.6	11.86
Port Eads	89	61	77.7	6.42
Rayville *f*	92	65	79.7	5.13
Saint Joseph	93	43	77.0	4.29
Shell Beach	90	62	79.1	7.80
Sugar Ex. station	96	57	78.5	9.41
Thibodeaux	.....	.....	.....	7.89
Trinity	91	55	77.6	4.70
Vidalia	98	52	75.1	6.17
Winnfield *e*	89	66	79.6	5.07
Maine.				
Bar Harbor	87	45	63.0	2.04
Belfast *	82	54	62.3	.....
Calais	88	41	64.8	3.33
Cornish	87	47	68.1	3.13
Fairfield	86	38	64.0	4.25
Fort Preble	.....	.....	.....	3.15
Kennebec Arsenal	88	.....	.....	3.15
Kent's Hill *d*	84	49	64.8	4.08
Lewiston	92	46	65.9	4.12
Mayfield *	83	41	63.2	5.70
Orono †	86	42	64.8	4.93
West Jonesport	78	44	56.4	.....
Maryland.				
Barren Creek Sp'gs †	89	49	71.2	5.40
Cumberland (1)	84	45	67.2	3.10
Cumberland (2)	84	49	68.6	2.94
Fort McHenry	90	50	70.4	5.22
Frederick	89	50	65.7	3.43
Gaithersburgh *	.....	53	66.2	.....
Galena † *	.....	58	73.8	5.84
Jewell *	.....	58	72.8	5.10
McDonogh	87	52	72.8	6.15
Woodstock	90	45	70.6	2.29
Massachusetts.				
Amherst	87	39	67.2	5.40
Amherst Ex Sta (1)	88	38	66.3	3.85
Amherst Ex Sta (2)	90	46	67.7	5.01
Blue Hill (sum't)	84	45	65.0	5.02
Blue Hill (base)	83	45	66.5	5.23
Blue Hill (valley)	87	41	67.5	5.17
Boston	.....	.....	.....	4.18
Brewster	87	50	67.8	1.39
Cambridge (1)	84	46	68.1	2.53
Cambridge (2)	86	45	69.9	3.44
Chestnut Hill	88	45	68.4	3.31
Clinton	.....	.....	.....	0.86
Cotuit	84	48	66.6	2.65
Deerfield *	90	52	69.5	.....
Dudley	91	43	68.7	2.11
Fall River	85	47	65.8	2.87
Fiskdale	.....	.....	.....	3.02
Fitchburg (1) *	88	50	67.5	2.62
Fitchburg (2)	86	39	67.0	2.92
Fort Warren	86	50	66.7	3.89
Framingham	90	45	69.0	3.42
Gilbertville	89	41	67.8	4.18
Groton	88	41	68.2	2.03
Heath *	92	44	69.2	.....
Holyoke	94	46	70.4	3.66
Lake Cochituate	94	40	68.0	3.17
Lawrence	91	44	69.2	3.43
Leicester	89	43	65.6	3.01
Leominster	.....	.....	.....	2.42
Long Plain *	86	51	69.4	3.03
Lowell (1)	88	44	68.2	2.59
Lowell (2)	90	42	68.2	.....
Lowell (3)	90	45	69.4	.....
Ludlow	90	34	64.6	4.37
Lynn	81	48	66.7	4.70
Mansfield	89	46	67.8	3.72
Medford	.....	.....	.....	3.51
Middleborough	87	43	66.4	2.42
Milton *	88	48	66.5	4.83
Monson	89	41	66.6	3.16
Mount Nonotuck	.....	.....	.....	5.36
Mystic Lake	.....	.....	.....	3.36
Mystic Station	.....	.....	.....	3.43
Nahant	83	48	63.2	5.72
New Bedford (1) *	82	47	65.3	3.83
New Bedford (2)	82	52	64.4	3.76
New Bedford (3)	84	48	66.0	3.52
Newburyport (1)	86	46	67.5	4.35
Newburyport (2)	.....	.....	.....	4.08
Northampton	92	45	69.2	7.17
North Billerica	94	41	71.2	4.92
Plymouth *	88	54	70.8	2.85
Princeton	87	40	65.0	2.71
Massachusetts—Con.				
Provincetown	85	51	66.9	1.82
Randolph	.....	.....	.....	3.60
Royalston *	92	52	68.4	6.38
Salem (1) *	86	51	69.5	.....
Salem (2)	.....	.....	.....	3.89
Somerset	96	50	71.1	3.13
South Hingham	.....	38	.....	3.57
Springfield Armr'y.	89	48	70.0	3.68
Swampscott	83	46	.....	.....
Taunton (1)	91	45	67.5	1.94
Taunton (2)	92	45	67.4	2.08
Taunton (3)	90	41	64.6	2.02
Waltham	.....	.....	.....	3.29
Wellesley	91	48	68.8	3.43
Westborough *	94	45	69.5	2.18
Williamstown	84	40	64.9	5.08
Winchester	.....	.....	.....	3.27
Worcester (1) *	88	50	69.5	2.40
Worcester (2)	85	46	68.2	.....
Mexico.				
Guanajuato	86	55	69.8	3.90
La Logia *	104	70	85.8	0.02
Leon de Aldemas	92	58	74.4	4.00
Mazatlan	89	81	85.3	6.48
Mexico	85	54	66.4	1.46
Topo Chico *	92	74	83.0	4.08
Topolobampo *	91	81	86.0	.....
Zacatecas	87	46	65.6	4.05
Michigan.				
Adamsville	.....	.....	.....	4.33
Adrian	86	39	63.2	4.48
Albion (1)	84	44	64.2	5.58
Albion (2)	.....	.....	.....	5.71
Allegan	.....	.....	.....	6.82
Alma	87	36	59.3	4.59
Ann Arbor	93	40	62.8	4.05
Arbela	.....	.....	.....	3.70
Atlantic	90	38	57.3	2.49
Ball Mountain	.....	.....	.....	2.00
Bear Lake	86	34	57.4	3.44
Bellaire	89	32	59.3	5.17
Bell Branch	78	40	64.7	3.64
Benzonia	83	36	57.2	3.71
Berlin	92	45	65.0	1.24
Berrien Springs *	89	45	66.6	2.72
Big Rapids	86	35	60.0	3.93
Birmingham	86	39	62.8	2.27
Bronson	82	42	60.7	5.31
Buchanan	83	40	61.5	5.35
Calumet	84	37	55.5	2.07
Cassopolis	85	43	64.6	6.35
Charlevoix	83	38	56.2	4.65
Chase	87	32	55.8	5.04
Chelsea	86	40	63.0	3.15
Colon	80	42	61.8	5.62
Concord	89	39	64.6	4.08
Deer Lake	88	34	63.7	4.90
East Tawas	83	29	58.4	1.47
Eden	85	40	63.6	4.15
Evart	94	32	58.9	3.40
Fitchburg	.....	.....	.....	3.24
Flint	90	38	62.6	3.38
Fort Brady	86 *f*	36	56.3	5.98
Fort Mackinac	75	36	54.0	8.42
Fort Wayne	86	40	63.9	3.84
Fremont	82	43	61.9	4.77
Grand Rapids	82	35	61.7	5.78
Grape	.....	.....	.....	4.50
Grayling	90	35	58.8	4.05
Hanover	82	42	63.2	4.80
Harrisville	84	40	56.6	3.83
Hart	90	33	60.8	4.50
Hastings	86	40	63.5	4.66
Hillman	89	38	57.6	4.13
Hillsdale	85	44	65.2	2.15
Highland Station	89	40	64.0	3.06
Hudson	86	37	63.4	3.79
Ivan	90	34	59.5	4.66
Jeddo	88	48	67.1	2.36
Kalamazoo	85	36	63.7	4.94
Lansing	84	40	62.9	3.65
Lathrop	90	33	59.5	4.49
Madison	.....	.....	63.4	3.84
Manchester	.....	.....	.....	3.83
Marshall	89	41	64.6	4.39
May	80	40	61.2	4.81
Mio	87	33	58.1	3.13
Montague	82	38	56.7	3.48
Mottville	84	40	64.0	5.73
Noble	.....	.....	.....	4.74
North Adams	89	41	61.2	.....
North Aurelius	.....	.....	.....	5.13
North Marshall	88	35	61.4	4.06
Olivet	90	38	62.6	6.27
Ovid	84	40	61.3	5.35
Paw Paw	85	36	62.5	6.73
Petersburgh	85	40	63.4	4.82
Pontiac	80	42	63.8	2.39
Pulaski	80	40	63.9	4.15
Rawsonville	82	42	64.7	2.26
Roscommon	92	34	59.0	3.73
Saint Ignace	.....	.....	54.8	7.36
Saint John's	84	42	60.8	3.94
Sand Beach	84	41	57.2	5.59
Standish	89	37	64.5	6.62

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Michigan—Cont'd.	°	°	°	*Ins.*
Stanton	85	38	60.6	5.38
Traverse City (1)	89	38	.....	4.15
Traverse City (2)	84	32	59.8	5.99
Thornville	86	44	65.5	2.38
Vandalia	80	42	61.4	4.42
Vienna	.....	.....	.....	6.23
Washington	83	38	61.4	1.83
Weldon Creek	.....	.....	.....	3.23
West Branch	87	39	57.9	5.30
Williamston	80	46	63.5	4.32
Ypsilanti (1)	86	39	63.6	5.50
Ypsilanti (2)	81*	42	64.0	4.11
Minnesota.				
Alexandria †	.....	.....	.....	1.64
Brainard	99	50	64.8	2.05
Farmington	90	48	65.9	3.43
Fergus Falls †	.....	.....	.....	1.36
Fort Ripley †	.....	.....	.....	2.66
Fort Snelling	91	37	64.6	1.75
Grand Meadow	96	40	65.2	3.30
L. Winnibigoshish	91	46	63.4	2.14
Leech Lake	93	29	61.6	1.63
Le Sueur *	90	45	67.5	2.95
Mankato	88	38	65.4	2.31
Medford	90	31	64.0	2.13
Minneapolis *	90	45	65.9	1.53
Morris	89	43	63.8	4.53
Northfield	.....	37	60.2	3.28
Ortonville †	.....	.....	.....	3.43
Pine River	89	40	64.1	0.91
Pokegama Falls	92	30	58.8	2.08
Red Wing	88	41	63.7	3.01
Redwood Falls †	.....	.....	.....	2.88
Rochester	88	42	63.9	3.31
Rolling Green	89	49	64.6	3.85
Tracy †	.....	.....	.....	2.21
Mississippi.				
Aberdeen †	94	40	72.6	6.75
Batesville †	98	46	76.3	9.55
Booneville †	95	43	74.2	8.65
Brookhaven †	96	42	78.0	7.25
Canton *	88	49	.....	7.04
Columbus †	104	43	79.7	7.64
Corinth †	92	46	76.0	9.95
Edwards †	94	48	78.3	7.69
Fayette	93 *j*	62 *j*	79.1 *j*	7.39
Greenville	89	48	75.4	7.09
Hazlehurst †	96	60	78.4	3.38
Hernando †	94	59	76.7	9.89
Holly Springs (1) *	90	50	74.0	7.74
Holly Springs (2) †	94	48	74.7	7.57
Jackson †	96	44	77.6	6.63
Kosciusko † *	93	57	74.1	5.33
Lake †	95	40	76.2	3.98
Lamar *	91	50	74.3	.....
Loch Leven †	.....	.....	.....	8.52
Logtown	93	50	77.0	3.64
Louisville †	98	39	77.0	6.10
Macon (1) †	91	46	75.6	7.60
Macon (2) †	98	42	77.4	1.72
Meridian †	101	45	77.8	2.35
Natchez †	97	48	79.0	6.76
Okolona †	98	44	76.8	5.43
Pearlington †	93	50	77.8	3.11
Port Gibson †	93	43	77.0	4.29
Pontotoc †	91	46	73.8	8.65
Rienzi *	90	52	74.2	7.60
Ripley †	.....	.....	.....	9.05
Summit †	93	44	75.4	5.40
Water Valley *	97	50	78.5	8.47
Waynesboro' (1) †	94	41	75.0	5.73
Waynesboro' (2)	94	41	75.0	3.31
Yazoo City †	.....	.....	.....	5.32
Missouri.				
Carthage	.....	.....	.....	4.29
Conception	88	51	69.3	2.42
Excelsior Springs *	97	40	70.5	3.80
Fayette †	94	41	.....	6.07
Fox Creek	90	42	69.7	3.15
Frankford (1) * d	.....	47	66.8	3.80
Glasgow	95	40	68.8	6.17
Grand Pass	92	43	69.4	6.50
Harrisonville	96	50	70.5	3.69
Hermann †	.....	.....	.....	4.86
Ironton	90	54	70.4	7.00
Jefferson Barracks	93	30	69.5	4.00
Jerome	.....	.....	.....	1.78
Kansas City	94	46	71.6	3.29
Kirksville	94	56	68.4	2.48
Lamont	95	57	77.9	4.76
Langdon	.....	.....	.....	2.82
Louisiana Bridge †	.....	.....	.....	2.84
Mexico	94	48	.....	4.49
Miami	98	42	70.5	5.85
New Frankfort *	92	42	69.6	8.80
New Haven	94	50	.....	6.00
Oak Ridge	88	40	.....	8.80
Oregon	89	47	70.2	3.81
Ozark *	95	40	76.7	2.92
Princeton *	98	55	76.6	6.65
Saint Charles (1)	.....	.....	.....	3.70
Saint Joseph †	.....	.....	.....	4.20
Savannah	93	50	.....	3.85
Sedalia	96	47	73.5	4.25
Shelbina	.....	.....	.....	3.40
Missouri—Cont'd.				
Springfield	91	50	70.6	7.28
Steelville	90	38	64.0	3.45
Willow Springs †	100	39	69.5	6.20
Wither's Mill	.....	.....	.....	3.35
Warrensburgh	90	53	69.4	5.71
Montana.				
Camp Poplar River	103	38	63.9	0.28
Custer †	.....	.....	.....	0.06
Fort Assiniboine	99	38	62.6	0.27
Fort Custer	100	36	64.2	0.90
Fort Keogh	104	42	67.8	0.18
Fort Logan †	90	35	59.2	0.82
Fort Maginnis	96	36	61.9	0.61
Fort Missoula	92	38	63.1	1.00
Fort Shaw	95	38	63.1	0.60
Galpin †	.....	.....	.....	0.72
Glendive †	101	33	59.4	0.75
Powder River *	110	48	75.4	.....
Sheldon *	96	50	65.7	0.30
Virginia City †	90	34	61.4	0.23
Nebraska.				
Ansley †	104	43	68.0	2.93
Ashland	95	43	69.9	5.63
Bingham †	.....	.....	.....	3.71
Brownville	90	46	71.4	4.20
Craig	93	56	69.2	8.75
Creighton †	98	42	67.2	3.53
Crete	91	43	70.5	2.50
Culbertson (1) †	.....	.....	.....	2.49
Culbertson (2) *	97	49	70.6	2.14
David City *	86	52	62.5	2.65
De Soto	92	40	68.9	6.37
Fairbury *	90	.....	.....	0.61
Falls City †	94	48	69.3	3.92
Fort Niobrara	95	34	64.8	2.92
Fort Omaha *f*	103	42	72.4	5.18
Fort Robinson	96	38	64.6	2.71
Fort Sidney	97	39	65.6	1.40
Franklin	93	45	69.1	3.62
Fremont *	90*	50	70.2	5.18
Genoa †	93	45	69.6	3.22
Gering *h*	.....	.....	.....	1.16
Hay Springs †	93	39	64.1	3.41
Kennedy †	100	42*	67.2	3.06
Kimball †	99	37	65.7	1.16
Marquette (1) *	94	52	.....	3.65
Marquette (2)	92	55	.....	3.65
Minden	94	54	70.2	5.71
North Loup †	98*	38	69.6	3.84
Oakdale	96	40	68.1	4.90
Palmer	92	48	66.4	3.65
Plattsmouth †	.....	.....	.....	4.90
Ravenna	90	41	.....	4.02
Red Willow	.....	.....	.....	4.52
Stratton *	.....	46	67.7	3.25
Syracuse *	89	55	70.9	3.34
Tecumseh †	90	50	70.3	3.85
Weeping Water *	93	44	67.2	3.58
West Hill	92	55	70.5	1.49
Weston	94	49	70.6	5.36
West Point †	90	.....	.....	9.55
Nevada.				
Battle Mountain *	96	48	70.2	0.23
Belmont	87	41	66.8	0.90
Beowawe (1) *	94	53	76.4	0.05
Beowawe (2)	94	53	74.9	0.05
Brown's *	104	48	82.6	0.04
Candelaria	95	46	71.1	0.21
Carlin *	102	56	74.6	1.15
Carson City	94	37	69.8	0.33
Crane's Ranch	.....	.....	.....	1.08
Downeyville	98	50	76.4	T.
El Dorado	110	68	91.6	T.
Elko (1) *	101	50	69.8	0.50
Elko (2)	102	34	67.6	0.70
Ely	93	33	65.5	0.23
Eureka	99	38	68.1	0.53
Fenelon *	96	50	75.0	0.10
Ferguson's Ranch	98	40	71.8	0.06
Genoa	86	41	65.2	0.07
Golconda *	94	54	77.8	0.00
Halleck *	104	50	71.9	0.53
Hawthorne (1) *	102	62	80.2	0.00
Hawthorne (2)	97	48	73.9	0.10
Hot Springs (1) *	90	50	75.2	0.00
Hot Springs (2)	106	50	71.4	0.00
Humboldt (1) *	94	54	71.5	0.25
Humboldt (2)	94	54	68.8	0.25
Lewer's Ranch	98	36	70.4	0.32
Montello *	108	51	77.8	0.89
Palisade *	100	50	73.7	0.23
Pioche	96	36	67.4	0.09
Punch Bowl	89	37	65.6	0.08
Reno *	98	49	73.5	0.00
Reno, State Univ'ty	92	38	69.6	T.
Ruby Hill	83	32	59.8	T.
Sodaville	102	45	75.7	0.01
Tecoma *	97	50	75.9	0.50
Toano *	96	50	74.7	0.36
Tuscarora	88	30	61.9	0.30
Verdi	95	50	68.5	0.01
Virginia City	89	45	71.0	0.06
Wadsworth *	97	62	77.8	0.24
Wells *	102	50	78.0	0.10
Winnemucca *	92	48	73.6	0.10

Meterological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
New Hampshire.	°	°	°	*Ins.*
Antrim	.....	.....	.....	3.89
Belmont	.....	.....	.....	3.81
Berlin Falls	90	28	63.2	.....
Berlin Mills	91	31	65.2	4.34
Bristol	.....	.....	.....	3.70
Concord	85	44	66.8	4.21
Hanover	86	40	65.4	3.61
Lake Village	.....	.....	.....	4.55
Manchester (1)	87	41	68.1	3.12
Manchester (2)	88	42	68.7	3.48
Mine Falls	.....	.....	.....	1.91
Nashua *	91	41	67.6	1.84
Newton	86	39	66.5	4.96
North Conway	88	37	69.5	3.74
North Sutton *	.....	55 n	65.2n	2.20
Pennichuck Sta	.....	.....	.....	2.07
Plymouth	94	35	65.5	4.61
Shaker Village	90	40	65.6	3.57
Stratford	96	34	64.4	5.03
Walpole	86	40	63.0	4.82
West Milan	87	30	62.4	4.87
Weir's Bridge	.....	.....	.....	4.21
Wolfborough	.....	.....	.....	3.22
New Jersey.				
Allaire	89	39	68.2	.....
Asbury Park	87	48	69.6	3.90
Beverly †	91	48	69.8	2.88
Billingsport L. H.	92	57	72.3	.....
Bridgeton	89	59	73.2	4.48
Cape May C. H.	87	50	74.3	.....
Egg Harbor City	88	47	68.9	3.40
Freehold	88	37	68.7	2.92
Gillette	91	40	68.6	3.54
Hanover	89	42	69.6	3.53
Highland Park	88	46	69.8	3.85
Hopewell	.....	.....	.....	5.05
Imlaystown	91	48	70.1	2.41
Jersey City d	94	50	71.6	.....
Lambertville	89	54	68.9	6.75
Locktown	89	49	70.3	5.92
Madison	90	41	69.0	3.56
Moorestown *	88	50	69.1	3.44
Newark	89	52	71.6	3.04
New Brunswick (1)	87	52	.....	3.38
New Brunswick (2)	87	47	70.0	3.64
New Brunswick (3)	87	46	68.8	.....
Ocean City	88	50	66.7	4.60
Oceanic	91	52	70.6	5.99
Paterson	89	55	69.9	.....
Plainfield	90	41	68.3	3.78
Princeton	91	48	70.1	2.41
Rancocas	89	53	.....	3.25
Readington *	90	60	72.1	.....
South Orange	88	46	68.4	3.54
Tenafly	91	41	69.5	2.39
Tom's River	89	42	69.8	2.92
Trenton	90	55	70.0	2.67
Union	86	55	68.5	3.78
Valley	.....	.....	.....	4.45
Woodbury	88	50	71.4	3.36
New Mexico.				
Coolidge	100	30	65.8	1.20
Deming *	104	60	81.8	0.90
Fort Bayard	92	43	69.4	0.90
Fort Marcy	90	40	64.8	0.61
Fort Selden	106	43	76.2	0.74
Fort Stanton	90	36	64.9	2.55
Fort Union	82	35	58.0	2.60
Fort Wingate	88	38	64.8	0.30
Gallinas Spring †	94	52	71.6	0.71
Hillsborough †	98	46	71.9	1.23
Las Vegas †	95	36	60.4	1.25
Lordsburg *	98	64	81.6	0.25
Los Lunas †	96	52	73.3	3.70
Red Cañon	.....	.....	.....	0.72
Springer †	.....	.....	.....	0.21
New York.				
Alfred Centre	82	41	61.3	5.66
Angelica †	83*	39	62.3	7.43
Arcade	84	36	62.4	8.41
Ardenia *	86	55	69.0	3.15
Auburn	82	41	64.6	7.49
Boyd's Corners *	93	56	70.8	4.76
Canton †	85*	38	62.8	6.70
Central P'k, N.Y.Cy.	91	52	70.5	2.39
Constableville † *	84	44	61.5	5.86
Cooperstown *	82	45	62.9	5.95
Davids Island	86	41	67.6	2.32
Eden	82	46	67.6	8.92
Elmira † *	89	50	68.0	5.18
Factoryville † *	83	41	64.6	6.50
Fleming *	87	46	62.5	.....
Fort Columbus	87	40	65.4	3.03
Fort Hamilton	85	52	68.0	3.60
Fort Niagara	82	47	63.2	3.94
Fort Porter	80	45	61.6	3.12
Fort Schuyler	84	49	67.4	4.25
Fort Wadsworth	89	49	69.7	3.67
Friendship *	82	46	61.8	4.92
Geneva	88	43	63.9	7.60
Hess Road Sta. †	80	47	61.9	12.13
Humphrey * †	82	46	63.2	8.35
Ilion †	90	34	64.9	6.45
Ithaca	88	42	65.6	6.74
Kingston †	94	38	70.2	5.46

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
New York—Cont'd.	°	°	°	*Ins.*
Lowville	84	40	.....	.....
Lyons	87	46	63.5	6.22
Madison Barracks	84	41	62.5	11.50
Middleburgh †	91	29	66.0	4.10
Newfane Station *	.....	46	64.1	.....
Nineveh *	88	48	66.2	12.10
North Hammond †*	86	50	65.3	7.36
Number Four †	83	30	59.5	8.49
Palermo †	86	42	63.0	7.17
Palmyra *	84	50	66.6	.....
Pendleton Centre *	.....	50	62.6	.....
Perry City *	85	46	63.3	6.49
Plattsburgh B'ks	85	42	65.5	4.17
Potsdam *	83	50	64.2	7.35
Queensbury *†	.....	53	67.0	4.91
Rome	89	33	64.2	6.25
Saranac Lake †	86	36	60.7	5.85
Savona †	89	42	64.6	3.54
Setauket *	84	50	68.4	2.91
Somerset *	.....	48	63.6	.....
South Canisteo *	87	48	63.6	7.19
South Kortright *†	.....	44	63.0	6.02
Tannersville †	80	34	62.1	9.80
Utica	96	30	66.0	6.58
Watervleit Arsenal	86	41	66.7	10.30
Wedgewood *	85	44	65.2	6.70
West Point	88	42	66.5	3.32
White Plains *	83	56	68.2	3.91
Willet's Point	86	48	68.6	2.38
North Carolina.				
Asheville (1) †	.....	.....	.....	4.51
Asheville (2)	90	37	67.2	4.77
Charleston *	.....	.....	.....	3.79
Fayetteville †	.....	.....	74.4	5.03
Goldsborough †	94	54	76.4	7.82
Grover *	.....	46	73.2	1.59
Highlands †	82	32	61.6	3.78
Hot Springs	87	40	65.3	.....
Lenoir *	84	43	69.0	5.90
Lumberton †	96	50	75.8	6.80
Mount Pleasant	92	45	72.4	6.02
Monroe	94	51	73.7	6.97
Morganton †	90	51	72.5	4.29
Mount Holly †	.....	.....	.....	7.94
Murphy †	.....	.....	.....	6.48
New Berne †	92	50	72.0	6.41
Raleigh	94	54	74.0	8.20
Salisbury	91	52	75.5	5.57
Soapstone Mount *	92	50	75.4	3.75
Southern Pines †	98	60	79.6	3.90
Statesville	91	45	72.7	6.20
Wadesborough †	94	48	74.7	4.75
Washington †	88	63	74.3	6.47
Weldon (1) †	94	50	74.0	8.82
Weldon (2) †	94	42	74.0	12.01
Ohio.				
Akron	85	42	64.8	6.34
Ashland	.....	.....	.....	6.04
Athens	88	40	66.8	5.33
Bangorville	86	38	64.3	4.54
Beallsville *	91	50	70.2	2.78
Bellevue *	84	44	64.6	2.68
Caledonia †	.....	.....	.....	4.64
Canton	88	40	66.8	4.89
Carrollton *	.....	45	65.7	4.90
Celina	84	42	66.4	3.68
Circleville (1) †	.....	.....	.....	3.47
Circleville (2)	.....	.....	.....	4.05
Clarksville	88	42	67.1	4.63
Cleveland	88	41	65.5	2.42
College Hill *	90	46	71.2	7.60
Collinwood *	.....	.....	.....	2.55
Columbus Barracks	90	42	63.1	2.68
Dayton	89	42	69.9	3.35
Demos	82	39	65.6	5.04
Ellsworth	.....	.....	.....	3.27
Elyria	88	38	65.8	2.63
Fostoria	.....	42	68.1	4.90
Gallipolis †	.....	.....	.....	3.35
Garrettsville	85	38	63.0	5.24
Georgetown	92	43	68.6	4.89
Granville	86	40	65.9	3.30
Greenville	83	44	65.4	4.58
Hanging Rock	89	41	66.9	4.60
Hiram	83	42	63.6	5.80
Jacksonborough	91	42	68.6	3.60
Jefferson	82	43	62.5	2.60
Kent	88	36	68.3	5.69
Kenton *	86	44	65.4	7.37
Leipsic	88	46	72.0	.....
Logan	90	40	66.9	3.61
Lordstown	86	45	65.9	3.76
Mansfield †	.....	.....	.....	4.88
Marietta (1) †	.....	.....	.....	3.97
Marietta (2)	88	42	69.2	4.04
McConnelsville	88	41	67.9	4.45
Napoleon †	88	41	67.4	3.98
New Alexandria	85	41	65.9	3.35
New Athens †	90	38	67.6	5.97
New Comerstown	88	40	66.7	3.06
North Lewisburgh	89	42	68.4	3.80
Oberlin	85	40	63.2	1.37
O. S. University	86	42	67.1	2.08
Orangeville *	.....	44	65.0	3.35
Ottawa †	.....	.....	.....	3.40

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Ohio—Cont'd.	°	°	°	*Ins.*
Poland *	.....	44	61.7	4.96
Pomeroy	92	42	71.3	3.58
Portsmouth (1) †	.....	.....	.....	4.17
Portsmouth (2)	90	45	68.8	4.32
Shanesville *	87	45	67.8	.....
Shiloh *	82	42	63.2	3.45
Sidney	90	41	69.0	7.80
Springborough	.....	.....	.....	2.75
Tiffin	86	45	66.6	2.47
Upper Sandusky	85	40	66.4	5.75
Vienna *	90	42	66.0	2.95
Wapakoneta	90	38	66.9	3.37
Wauseon	85	38	64.8	3.69
Waverly	89	44	69.9	4.87
Waynesville	.....	.....	.....	3.49
Westerville	88	41	65.9	3.10
West Milton *	95	43	70.9	6.55
Weymouth	.....	.....	.....	5.19
Wooster	87	38	64.5	4.85
Yellow Springs	86	42	67.2	5.06
Youngstown	89	42	67.6	4.99
Zanesville †	.....	.....	.....	4.30
Oregon.				
Albany †	95	45	66.1	0.55
Ashland *	98	55	76.3	0.10
Bandon	68	49	56.6	0.57
East Portland	90	52	.....	0.53
Eola *	90	47	65.0	0.45
Fort Klamath	92	28	60.2	0.41
Grant's Pass †	102	41	68.4	0.09
Heppner †	96	37	67.0	0.66
La Grande	90	43	63.7	1.31
Mount Angel †	92	40	66.9	0.44
Parkers	.....	.....	.....	1.18
Siskiyou *	98	46	69.8	0.19
Tillamook *	78	46	61.8	3.26
Pennsylvania.				
Allegheny Arsenal	88	43	68.1	5.70
Altoona	88	48	69.6	4.73
Aqueduct	90	55	70.4	4.85
Bethlehem	88	46	70.2	5.28
Blue Knob	90	40	64.5	2.30
Brookville †	.....	.....	.....	9.36
Carlisle	93	50	69.1	4.59
Charlesville	86	43	64.8	4.26
Clarion	.....	.....	.....	8.12
Coatesville	90	42	68.7	5.99
Confluence †	.....	.....	.....	4.69
Corry	90	38	63.2	5.12
Coudersport	86	35	65.2	4.80
Drifton †	86	44	63.6	4.99
Doylestown	.....	.....	.....	5.82
Dyberry †	85	33	63.0	4.24
Easton *	.....	.....	.....	3.77
Edinborough *	82	40	63.2	.....
Emporium	90	38	68.2	4.63
Falls of Neshaminy	82	54	66.5	4.49
Franklin *	86	44	63.6	5.25
Frankford Arsenal	90	53	71.6	3.00
Frederick	.....	.....	.....	6.41
Freeport † ‡	.....	.....	.....	5.00
Germantown	88	50	71.7	3.27
Girardville	85	47	66.0	8.01
Grampian Hills	88	48	66.7	3.71
Greensborough †	.....	.....	.....	6.79
Greenville	87	42	63.5	3.51
Hollidaysburgh	90	40	66.0	2.71
Honesdale	82	35	63.7	3.13
Huntingdon	89	38	65.2	5.60
Indiana	87	44	67.9	3.39
Lansdale	.....	.....	.....	5.45
Le Roy *	86	45	65.5	6.94
Lock No. 4 †	.....	.....	.....	5.67
Mahoning †	.....	.....	.....	4.09
McConnellsburgh	87	40	66.2	5.17
Meshoppen † *	.....	48	66.7	4.34
Myerstown	87	43	66.3	8.66
New Bloomfield	90	40	66.2	6.25
New Castle	87	38	68.7	6.50
Nisbet *	.....	53	65.2	6.20
Oil City †	.....	.....	.....	7.04
Ottsville	.....	.....	.....	7.58
Parker's Landing † ‡	.....	.....	.....	4.42
Petersburgh	90	44	65.4	3.10
Philadelphia	.....	.....	.....	2.89
Philipsburgh	88	38	62.4	5.84
Pleasant Mount *	.....	52	64.6	7.15
Point Pleasant	.....	.....	.....	5.32
Pottstown	91	53	71.3	6.20
Quakertown	88	40	67.2	7.31
Reading †	95	44	70.0	8.21
Rimersburgh	86	47	68.2	.....
Salem Corners	85	44	64.4	6.47
Saltsburgh † ‡	.....	.....	.....	4.93
Scisholtzville	.....	.....	.....	7.91
Selin's Grove	86	55	68.2	5.10
Smethport	88	38	67.4	5.93
Smith's Corners	.....	.....	.....	7.54
Somerset	83	41	60.4	3.87
State College †	85	37	64.9	5.77
Swarthmore	87	46	69.3	5.48
Tipton *	90	48	65.7	3.50
Troy *	89	46	64.6	3.44
Tuscarora *	92	57	71.4	6.63
Uniontown	87	44	67.8	7.36

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Pennsylvania—Con.	°	°	°	*Ins.*
Warren † ‡	.....	.....	.....	3.86
Wellsborough *	86	42	64.6	10.04
West Chester	86	48	69.4	5.38
Wysox	88	39	69.0	4.86
York	91	49	66.5	5.13
Rhode Island.				
Bristol	81	49	65.3	2.59
Fort Adams	85	45	62.7	3.98
Kingston (1)	87	42	64.5	3.66
Kingston (2)	.....	.....	.....	4.25
Lonsdale	.....	.....	.....	2.60
Newport	80	52	64.6	.....
Olneyville	90	50	70.8	.....
Pawtucket	.....	.....	.....	3.02
Providence (1)	92	50	69.1	2.90
Providence (2)	90	47	68.8	2.35
South Carolina.				
Allendale †	98	46	76.6	5.02
Batesburgh †	96	44	76.8	6.74
Beaufort *†	89	55	77.0	5.93
Belmont	94	43	68.5	6.06
Blackville †	98	42	78.0	6.60
Branchville †	94	47	75.4	2.29
Brewer Mine	99	40	69.5	2.35
Cedar Springs †	95	48	72.3	2.61
Cheraw †	96	50	76.4	4.57
Chester †	99	44	75.9	6.40
Clinton	96	52	74.0	3.65
Conway	92	45	68.5	3.57
Evergreen	93	30	66.0	5.53
Florence †	96	50	77.6	4.31
Greenville †	94	42	74.5	4.05
Greenwood	96	42	76.0	4.58
Hardeeville †	98	46	76.9	6.12
Jacksonborough †	99	44	75.7	4.46
Kingstree †	96	46	75.8	4.64
Kirkwood *	.....	53	72.3	5.15
Saint Georges †	96	48	76.2	5.35
Saint Matthews †	96	46	75.1	6.07
Spartanburgh (2) †	100	42	69.2	6.44
Statesburgh †	94	47	74.1	5.10
Timmonsville	90	57	73.5	5.74
Trial	94	43	68.5	5.23
Winnsborough	99	42	70.5	7.84
Yorkville	94	42	68.0	6.46
Tennessee.				
Andersonville	85	46	69.2	7.47
Arlington †	94	43	72.8	6.60
Ashwood † *	87	45	71.9	3.34
Austin †	90	48	73.4	5.38
Bolivar †	92	45	72.7	6.01
Brownsville †	96	40	74.7	7.08
Carthage †	.....	.....	.....	5.64
Clarksville	88	48	72.2	3.34
Cog Hill	90	40	72.8	2.35
Columbia †	.....	.....	.....	4.66
Covington (1)	87	54	72.2	8.18
Covington (2) †	96	45	73.2	7.80
Cumberland Gap	83	43	66.3	5.41
Dunlap	91	62	76.5	6.53
Dyersburgh †	98	43	74.2	8.16
Fayetteville	89	43	72.8	3.39
Florence Station	83	52	71.9	4.04
Fostoria	83	44	67.8	6.82
Grand Junction †	90	43	72.6	9.07
Greeneville	82	41	66.8	6.29
Hohenwald	92	38	69.3	6.69
Jacksonborough	84	44	69.7	6.24
Johnsonville †	.....	.....	.....	3.51
Kingston † d	86	54	71.8	6.14
Kingston Springs	90	44	70.1	6.22
Lawrenceburgh	86	38	70.9	4.53
Leeville	88	48	72.5	4.75
Lewisburgh	87	51	71.6	3.01
Lookout Mountain †	78	44	69.8	4.20
Maryville	95	50	75.0	7.90
McKenzie	94	46	73.9	9.03
McMinnville	87	50	71.5	4.62
Milan (1)	90	46	71.6	8.81
Milan (2) †	96	44	73.8	7.82
Nunnelly	90	37	69.9	5.32
Parksville	86	41	70.3	7.66
Riddleton	88	43	71.3	7.21
Rogersville	87	44	70.1	3.33
Rugby	84	48	68.8	6.30
Savannah	90	46	73.3	6.10
Springdale	92	46	71.4	3.29
Tullahoma	85	53	71.4	2.26
Watkins	89	50	73.2	4.94
Waynesborough	82	42	70.0	5.08
Woodstock	95	54	75.9	3.80
Texas.				
Austin (1.)	95	60	79.8	5.34
Austin (2) *	92	62	78.6	.....
Belton †	94	59	76.4	10.98
Brady †	95	58	75.7	7.33
Brazoria †	89*	58	78.2	6.67
Brenham †	96	61	81.0	5.26
Brownwood †	92*	56	77.8	8.90
Camp Eagle Pass	106	55	85.0	2.83
C'p Peña Colorado	102	53	71.3	6.04
Cedar Hill *	94	59	76.2	6.00
Cleburne	88	60	77.4	7.39
College Station	99	58	80.6	9.01
Columbia Station †	93	57	79.8	7.12

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Texas—Cont'd.	°	°	°	*Ins.*
Corsicana (1)	.....	.....	.....	5.72
Corsicana (2) †	94	54	77.4	5.45
Cuero †	93	72	83.8	3.62
Dallas (1)†	94	60	78.9	7.81
Dallas (2)	94	56	76.7	7.41
Decatur †	91	56	73.1	6.60
Duval *	96	60	81.0	9.10
Edinburgh †	.....	.....	.....	3.67
Forestburgh *	.....	68	75.2	7.00
Fort Bliss	105	53	80.7	.....
Fort Brown	93	65	81.9	4.40
Fort Clark	103	60	82.1	4.84
Fort Davis	96	50	72.6	2.23
Fort Elliott	99	43	72.0	2.42
Fort Hancock	108	42	77.3	0.43
Fort McIntosh	104	59	84.6	1.85
Fort Ringgold	108	62	85.7	3.46
Fort Worth †	91*	59	75.2	4.93
Fredricksburgh *†	93	64	75.0	5.17
Gainesville *†	93	62	74.6	7.49
Gallinas †	99	54	80.0	3.11
Graham †	93*h*	59*o*	75.8	7.44
Granbury *†	91	62	77.0	8.09
Hearne †	90	58	77.0	7.66
Houston †	93	56	79.6	10.67
Howe *†	93	61	73.6	4.84
Huntsville†	76	57	79.8	7.64
La Grange †	.....	60	74.7	8.83
Lampasas †	91	55	76.9	12.65
Longview †	94	62	77.7	12.31
Luling †	96	60	80.4	7.78
Menardville †*	101	64	75.6	6.95
Merkel †*	.....	60	74.7	6.33
Mesquite †	99	62	76.6	6.51
New Braunfels†	100	54	77.5	7.42
New Ulm	93	60	77.4	6.21
Paris†	94	42	74.6	2.74
Pecos City †*	104	55	70.5	1.35
San Antonio	104	57	83.5	3.77
Santa Maria †	.....	.....	.....	3.71
Silver Falls†	91*i*	53*k*	71.8*k*	3.47
Tyler †	96	56	78.5	10.27
Waco †	96	58	78.8	8.80
Weatherford †	94	55	75.4	8.02
U. S. of Colombia.				
Colon	93	70	79.9	31.26
Utah.				
Beaver *†	.....	42	62.8	0.86
Blue Creek *	99	61	82.8	0.00
Corinne *	97	52	74.9	0.00
Fort Douglas	96	50	71.8	T.
Fort DuChesne	97	35	66.7	0.15
Kelton *	99	61	77.4	0.20
Levan	.....	.....	.....	0.90
Losee * †	96	50	66.1	0.15
Nephi †	102	32	68.2	0.09
Ogden *	98	45	70.8	0.05
Price †	.....	.....	.....	0.00
Promontory *	90	48	66.9	0.00
Saint George	107	58	80.6	0.05
Terrace *	90	65	76.5	0.50
Vermont.				
Brattleborough (1)	89	41	66.8	4.01
Brattleborough (2)	85	43	64.9	.....
Burlington	82	44	65.7	6.26
Chelsea *	77	44	59.8	6.59
Cornwall	.....	.....	.....	5.07
Coventry *	92	44	66.3	12.35
East Berkshire †	88	36	62.3	7.40
Jacksonville	88	35	63.4	5.15
Lunenburgh	95	37	68.1	5.43
Manchester *	86	48	66.0	8.42
Newport *	80	47	65.2	7.70
Saint Johnsbury	89*	36	62.8	6.40
Strafford *	86	42	66.8	5.20
Vernon *	96	48	67.9	3.84
Virginia.				
Abingdon †	.....	.....	.....	6.60
Alum Springs *	86	50	67.2	3.57
Bird's Nest	90	59	73.6	5.25
Bolar *	90	34	58.0	3.90
Virginia—Cont'd.	°	°	°	*Ins.*
Christiansburgh †	86	38	66.0	3.97
Dale Enterprise †	96	42	72.8	3.20
Fort Monroe	92	54	74.2	4.34
Fort Myer	92	47	70.2	4.45
Lexington	90	42	67.0	3.98
Petersburgh †	90	51	71.6	7.94
Smithfield *	88	50	72.2	5.24
Spottsville	98*	48	72.8	8.82
Summit	90	42	69.0	.....
University of Va	.....	.....	.....	4.72
Wytheville	89	39	59.4	8.08
Washington Territory				
Blakeley † *	83	42	60.0	0.89
Fort Spokane	95	41	67.4	0.23
Fort Townsend	82	41	60.7	0.29
Fort Walla Walla	99	45	69.0	2.53
Vancouver B'ks	88	50	69.6	0.35
Vashon	90	47	61.8	0.95
West Indies.				
Hamilton, Bermuda	79	64	75.4	2.63
Port au Prince (Hayti)	94	66	80.1	3.91
West Virginia.				
Buckhannon †	.....	.....	.....	5.76
Charleston †	.....	.....	.....	7.19
Eglon *	.....	40	57.8	7.50
Ella *	.....	48	66.0	.....
Gladesville * *l*	81	56	67.2	.....
Glenville †	.....	.....	.....	4.51
Hinton †	.....	.....	.....	3.50
Kingwood *	89	44	67.8	.....
Morgantown †	.....	.....	.....	4.47
Pleasant Hill *	84	44	66.8	5.00
Rivesville *	91	48	68.6	8.45?
Rowlesburgh (1)	.....	.....	.....	5.30
Rowlesburgh (2) *	.....	47	68.9	9.65
Seven Pines *l*	90	50	67.8	.....
Tyler Creek *	89	41	70.2	6.45
Weston †	.....	.....	.....	3.96
Wheeling †	.....	.....	.....	3.71
White Sulph. Sp'gs †	.....	.....	.....	4.32
Tannery *	.....	50	70.1	.....
Wisconsin.				
Cadiz *	.....	46	64.6	9.50?
Chippewa Falls †	.....	.....	.....	2.94
Delevan	.....	.....	.....	3.21
Embarrass *	88	46	63.2	3.50
Fond du Lac	85	37	62.0	4.18
Friendship *	.....	48	64.2	1.50
Glasgow † *	.....	48	64.6	3.65
Grantsburgh †	90	39	65.2	1.96
Greenwood †	89	36	61.5	3.69
Haywood † *	95	49	70.6	2.15
Lancaster	88	40	63.5	2.57
Lincoln *	.....	41	61.8	4.00
Madison	83	42	63.5	2.00
Manitowoc	80	36	60.1	4.28
Medford † *n*	.....	.....	.....	1.90
Neillsville *	96	32	68.0	.....
Oshkosh †	88	40	63.3	3.49
Phillips †	.....	.....	.....	2.30
Portage †	.....	.....	.....	3.78
Richland Centre *†	77	47	64.3	3.11
Summit Lake †	92	34	60.1	?
Viroqua *	.....	40	63.0	1.90
Waucousta	.....	38	57.5	.....
Weston *	.....	46	63.8	9.76
Wausau † *k*	89	41	66.2	6.28
Wyoming.				
Carter †	.....	.....	.....	0.60
Camp Pilot Butte	93	30	66.0	0.11
Camp Sheridan	87	33	57.4	0.66
Fort Bridger	.....	23	.....	0.62
Fort D. A. Russell	92	28	56.2	4.12
Fort Laramie	98	39	65.4	1.62
Fort McKinney	95	37	63.1	1.64
Fort Washakie	90	32	60.8	2.98
Sweetwater Bridge †	.....	.....	.....	1.14
Lusk †	95	37	62.4	1.39
Wheatland	81	.....	.....	3.37

Reports received too late for publication in May.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Arizona.				
Florence	102	45	75.0	.....
California.				
Alcade *	.....	.....	.....	0.62
Beaumont *	90	43	66.6	0.29
Boulder Creek *	90	45	61.0	4.78
Brentwood *	95	52	72.3	0.87
Delano *	104	48	71.8	0.16
El Verano *	85	48	61.4	3.38
Galt *	82	50	66.8	2.04
Livermore *	94	48	62.3	2.25
Marysville *	92	52	75.6	2.35
Norwalk *	95	57	68.1	0.20
Ontario *	86	62	71.6	1.10
Pleasanton *	88	42	63.2	1.36
Portersville *	109	53	75.0	0.89
Salton *	108	58	79.2	0.00
Sisson *	86	30	55.5	2.00
Whittier *	.....	.....	.....	0.93
California—Cont'd.	°	°	°	*Ins.*
Woodland *	.....	.....	.....	1.46
Dakota.				
Sanborn	.....	.....	.....	2.40
Indian Territory.				
Guthrie	.....	.....	.....	4.26
Woodward	.....	.....	.....	1.80
Kansas.				
Emporia	89	35	64.4	8.15
Louisiana.				
Luling	91	45	70.0	0.02
Mexico.				
Topolobampo *	91	75	81.8	.....
Nevada.				
Carlin	95	30	59.9	1.05
Fenelon *	96	34	63.9	1.70
New Mexico.				
Albuquerque	89	34	63.0	T.

Reports received too late for publication in May—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Pennsylvania.				
State College	92	33	61.0	4.98
Colony of Surinam, South America.				
Burnside-Coronie	90	73	79.6	8.64
Texas.				
Huntsville	90	48	73.4	2.30
U. S. of Colombia.				
Colon	.....	.....	.....	21.00
Utah.				
Losee * *k*	90	38	65.1	0.35
Virginia.				
Summit	88	34	62.0	.....
Wyoming.				
Lusk †	78	22	51.4	1.28
Wheatland	72	.....	.....	3.45

NOTE.—Letters of alphabet denote number days missing in the report.
* Maximum and minimum temperature from observed readings. † Observations from Signal Service instruments. ‡ Observations made once a week. § Probably ten times too small.

Mean temperature at Milton Centre, Norfolk Co., Mass. Observations taken at sunrise and 1 p. m., by Mr. Charles Breck, Milton, Mass.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1849	21.6	19.5	34.6	49.6	52.5	66.5	70.2	68.9	62.5	51.0	45.2	31.1	47.0
1850	29.0	31.9	33.1	43.4	52.3	67.5	70.5	67.9	62.0	52.7	42.3	27.9	48.4
1851	28.5	30.9	38.0	46.0	56.6	69.1	69.7	67.5	61.2	53.6	36.6	24.4	48.5
1852	22.6	26.3	33.9	41.3	59.2	65.7	73.2	66.0	64.6	51.0	39.3	37.1	48.4
1853	28.4	30.3	36.5	45.6	56.5	66.4	69.9	70.4	63.4	51.7	43.7	29.1	49.3
1854	26.3	25.5	31.6	43.7	61.5	66.0	74.0	68.0	62.5	53.7	43.5	27.0	48.6
1855	30.6	22.6	33.6	44.5	54.9	66.0	72.8	66.4	62.3	53.4	42.5	32.9	48.5
1856	19.8	26.3	28.5	46.9	54.5	68.0	74.4	68.7	63.4	51.6	39.2	25.7	47.2
1857	17.5	35.0	33.6	40.4	55.0	63.9	71.2	68.4	63.0	50.2	42.5	34.2	47.7
1858	31.9	23.5	32.2	44.5	53.5	67.6	69.4	66.5	62.1	53.6	36.2	29.5	47.5
1859	26.8	30.4	39.3	43.3	58.9	64.4	69.6	67.9	59.4	47.1	41.2	25.5	47.8
1860	28.6	27.5	38.2	43.7	55.4	65.2	69.8	69.9	59.8	51.7	44.0	28.5	48.3
1861	23.9	33.9	35.5	44.6	54.1	65.4	71.2	66.9	60.8	54.8	40.4	33.1	48.7
1862	26.1	25.4	34.8	44.5	58.2	73.8	68.8	68.9	62.9	55.2	43.3	31.4	48.6
1863	32.1	29.1	29.9	44.5	57.5	62.2	70.3	72.0	59.5	53.1	44.6	28.2	48.6
1864	28.2	31.5	36.7	43.5	57.8	66.7	71.7	72.0	59.6	48.2	41.7	30.4	49.0
1865	19.5	28.8	40.4	49.9	50.1	68.5	70.7	69.7	67.2	49.2	42.4	32.6	49.7
1866	24.1	29.8	33.8	48.4	54.9	65.4	74.2	65.0	62.7	51.4	43.8	30.1	48.6
1867	20.8	34.6	31.6	46.6	54.2	66.4	69.0	70.0	64.4	51.4	40.4	24.7	47.8
1868	24.5	21.7	35.2	43.5	52.5	62.1	72.8	70.1	60.6	47.5	38.5	27.7	46.4
1869	31.4	31.5	30.8	46.5	55.4	64.4	69.6	67.6	63.3	49.7	37.2	31.6	48.2
1870	34.6	25.5	31.3	46.5	56.2	68.9	72.3	72.7	62.6	54.9	43.6	32.7	50.2
1871	26.6	28.8	43.0	48.1	57.7	65.5	69.9	71.3	58.6	52.4	37.0	28.2	48.9
1872	28.2	29.8	26.5	45.5	59.6	68.0	73.9	72.0	62.6	53.0	39.7	23.9	49.1
1873	25.5	28.4	34.2	45.0	57.1	67.0	72.5	68.1	62.6	53.2	34.2	32.9	48.4
1874	31.8	27.7	36.6	40.2	53.4	66.4	72.1	66.0	63.0	52.5	40.7	30.3	48.4
1875	20.0	23.6	31.3	42.7	58.4	66.9	70.3	70.8	60.9	51.6	35.0	31.0	46.9
1876	33.3	31.6	35.7	45.7	58.7	70.5	75.1	70.9	61.2	48.0	42.4	24.9	49.8
1877	25.1	33.9	37.7	47.0	58.0	66.0	71.6	71.6	64.0	52.2	46.1	37.8	50.8
1878	29.1	32.3	41.8	51.2	57.4	66.9	73.2	70.0	65.3	56.6	40.3	31.6	51.3
1879	24.7	25.2	35.4	45.1	62.8	63.4	71.1	68.7	61.8	58.9	41.0	35.1	49.7
1880	36.2	32.8	36.2	48.1	66.0	69.9	72.8	70.5	64.5	53.4	37.9	27.3	51.4
1881	22.4	26.3	37.8	44.6	59.0	62.5	69.9	71.1	67.5	54.8	42.8	38.8	50.0
1882	29.2	31.2	37.2	43.8	51.5	66.1	72.1	70.1	64.5	56.0	37.4	29.2	49.3
1883	24.1	29.1	30.8	44.3	57.9	70.6	71.9	67.4	61.3	48.6	44.6	30.2	48.6
1884	25.2	34.5	35.7	45.2	57.8	68.3	69.9	70.3	67.0	54.0	41.7	34.1	49.7
1885	29.0	22.0	29.8	49.0	54.9	70.4	73.4	68.6	61.3	54.4	44.8	34.4	49.4
1886	28.4	26.8	35.5	53.6	59.2	65.7	71.4	67.6	63.6	53.2	44.4	30.0	50.0
1887	27.0	28.4	33.2	45.8	62.8	67.9	77.0	69.0	60.7	52.7	42.8	34.7	50.1
1888	21.1	31.6	33.6	44.6	54.4	64.0	60.4	69.5	60.4	49.4	44.5	35.8	49.8
Mean	26.6	28.6	34.6	45.5	56.7	66.7	71.3	69.1	62.5	52.3	41.2	30.6	48.8

Precipitation (in inches and hundredths) observed at Fort Towson, Ind. T., by assistant surgeons, U. S. Army.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1836	.....	.....	.....	.....	.....	5.90	1.30	2.30	3.70	6.20	2.80	1.40	.....
1837	1.00	1.60	6.00	2.50	6.30	6.10	7.00	1.10	5.40	3.10	2.10	1.60	43.80
1838	4.20	2.10	1.60	1.90	6.70	0.70	2.10	3.70	0.30	2.80	5.40	2.90	34.40
1839	7.10	1.35	5.20	1.60	7.50	17.50	6.40	5.10	2.10	3.90	7.00	1.30	66.05
1840	4.40	3.00	3.70	13.60	2.30	1.60	4.80	3.00	6.20	8.60	3.00	1.50	55.70
1841	3.60	0.20	7.30	3.20	3.30	7.00	*7.53	3.50	6.50	9.90	9.20	8.30	64.53
1842	2.70	7.50	7.40	10.30	8.80	14.22	4.70	4.00	4.00	1.85	2.06	5.85	73.38
1843	2.78	0.25	3.35	7.10	9.26	1.91	4.40	5.72	4.40	6.56	9.37	0.80	55.90
1844	3.45	2.08	4.56	10.38	3.25	2.66	5.35	7.96	1.30	2.77	1.73	1.05	46.54
1845	3.00	0.70	5.73	3.49	5.17	6.35	0.00	3.26	2.48	4.90	1.19	1.81	38.08
1846	3.20	2.00	5.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1849	.....	.....	.....	.....	.....	6.21	10.76	3.57	2.54	3.66	2.91	6.17	.....
1850	4.03	4.07	2.85	4.79	2.04	5.06	3.29	4.39	2.66	5.19	6.21	5.07	49.65
1851	1.70	11.09	2.66	2.52	6.33	5.04	*1.40	7.34	0.01	1.13	3.69	*5.37	48.28
1852	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.88	4.84	0.77	.....
1853	1.72	2.90	3.88	4.99	9.09	0.90	5.38	0.49	6.11	3.40	1.97	1.27	42.10
1854	1.01	2.00	5.10	2.22	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means	3.14	2.92	4.67	5.28	5.84	5.80	4.24	3.96	3.41	4.59	4.23	3.01	51.53

* Interpolated.

Precipitation (inches and hundredths) observed by assistant surgeons, U. S. Army and Signal Service observers at Fort Brown, (Brownsville) Texas.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1850	4.30	3.80	2.30	0.05	2.20	0.06	1.16	0.01	0.25	5.79	0.69	0.15	20.76
1851	0.95	1.20	0.40	1.15	0.90	2.35	3.65	1.80	5.60	4.10	3.00	4.70	29.80
1852	0.50	0.60	0.35	0.00	4.05	5.05	0.70	3.90	8.50	4.95	0.90	0.00	29.50
1853	0.00	1.60	0.00	2.20	0.10	1.70	0.00	3.10	8.00	7.75	1.30	0.65	26.40
1854	0.45	1.50	0.15	0.05	4.10	7.65	4.25	5.00	11.31	5.79	7.47	1.88	49.60
1855	3.47	4.83	3.03	0.00	1.92	10.47	7.58	9.52	9.44	5.77	3.85	0.00	59.88
1856	3.18	1.80	1.50	0.88	2.05	3.25	1.90	0.58	3.25	5.75	1.45	0.40	25.99
1857	0.10	0.35	2.30	1.15	0.00	0.50	3.25	0.65	4.65	4.65	0.55	0.85	19.00
1858	1.50	0.85	0.07	0.00	1.00	5.15	0.70	2.45	5.77	2.75	0.43	1.01	21.70
1860	.....	.....	.....	.....	0.05	0.00	0.19	8.00	9.07	0.57	0.15	2.23	.....
1869	.....	.....	.....	.....	.....	.....	.....	2.46	10.50	1.20	0.10	.....	.....
1870	1.60	0.00	0.00	0.90	0.00	1.00	0.75	0.10	2.53	1.00	0.70	0.30	8.88
1871	0.90	0.00	0.30	0.10	3.40	0.78	0.40	1.40	2.80	8.50	1.77	0.05	20.40
1872	0.05	0.00	1.64	0.82	0.27	1.78	1.92	4.19	4.56	3.61	1.60	1.98	22.42
1873	0.00	0.15	0.47	0.59	0.96	0.43	1.10	1.98	15.35	2.81	1.71	2.10	27.65
1874	0.86	1.48	1.90	0.30	1.34	1.50	2.81	9.30	10.96	0.48	4.76	0.16	26.85
1875	0.56	3.72	1.62	0.05	1.45	0.16	0.40	2.25	4.20	0.50	3.35	0.10	18.36
1876	0.10	1.03	0.98	0.00	4.36	1.26	2.10	0.97	8.85	0.22	2.43	3.51	25.81
1877	1.27	7.99	0.51	0.14	1.03	0.95	0.90	1.52	0.69	3.33	1.21	6.32	25.86
1878	3.67	0.63	4.15	1.25	2.90	0.74	6.58	7.20	5.21	0.86	1.76	1.34	36.35
1879	1.03	1.03	0.33	1.57	0.05	2.55	1.59	9.48	11.64	4.70	0.14	0.62	34.73
1880	3.87	1.02	0.58	0.01	1.56	1.03	3.64	16.58	1.90	3.82	3.44	0.58	38.07
1881	2.73	1.18	0.20	0.30	3.43	T.	1.49	3.01	5.02	8.72	3.74	1.92	31.74
1882	2.95	1.24	3.54	1.63	7.07	1.69	0.70	2.21	2.68	3.19	3.28	2.38	32.56
1883	1.22	1.01	0.63	0.38	0.83	5.66	4.02	1.97	7.74	1.65	3.32	2.59	31.02
1884	1.10	T.	0.07	0.57	5.86	2.74	0.23	0.88	8.96	15.71	3.46	1.33	40.91
1885	3.87	2.52	1.54	0.67	7.17	0.54	0.22	2.06	3.55	8.29	0.20	1.20	31.83
1886	1.81	2.33	1.15	0.17	6.57	7.78	4.88	3.08	30.57	0.55	0.48	0.69	60.06
1887	0.22	0.68	2.87	0.07	2.94	13.80	0.83	1.45	13.65	16.27	1.70	4.89	59.87
1888	1.98	1.09	2.31	4.79	1.77	2.95	.....	.....	.....	.....	.....	.....	.....
Mean..	1.58	1.56	1.25	0.71	2.43	2.88	2.05	3.38	7.49	4.59	2.03	1.57	31.70

Precipitation (inches and hundredths) observed by assistant surgeons, U. S. Army, and Signal Servive observers, at Whipple Barracks (Prescott), Ariz.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1865	.....	.....	.....	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....
1866	.....	.....	.....	.....	.....	.....	.....	.....	3.65	0.37	0.08	0.31	.....
1867	1.72	1.16	8.00	0.06	1.17	0.00	2.70	2.38	.....	0.10	0.20	2.20	.....
1868	2.97	5.30	0.50	1.00	.....	0.00	6.16	2.72	0.30	0.55	1.50	4.40	.....
1869	0.80	0.92	.....	.....	.....	.....	.....	.....	1.40	1.45	0.00	.....	.....
1870	0.00	1.20	1.09	0.26	1.73	0.24	7.98	3.49	0.00	1.59	0.30	0.53	18.41
1871	0.70	1.01*	0.10	1.92	0.47	0.00	4.00	1.80	1.51	1.40	0.52	0.00	13.43
1872	0.50	0.80	0.12	1.62	1.47	1.24	3.74	6.25	0.04	0.24	0.00	0.64	16.66
1873	0.00	1.00*	0.23	0.17	0.40	0.42	1.56	4.76	0.30	0.00	0.80	2.55	12.21
1874	5.51	5.68	3.56	1.70	0.65	0.00	5.72	1.56	0.00	0.50	.....	.....	.....
1875	.....	.....	.....	.....	0.00	0.00	5.92	1.66	0.77	0.00	0.18	0.63	.....
1876	4.60	0.01	0.83	0.51	0.52	0.25	3.28	4.51	0.72	0.93	0.00	0.00	16.16
1877	0.36	0.56	0.49	1.59	1.82	0.00	1.29	0.24	2.42	1.36	0.00	2.23	12.27
1878	0.28	2.02	0.48	2.86	0.33	0.33	0.91	6.34	0.61	0.00	0.45	1.02	15.63
1879	0.91	0.94	0.05	0.03	0.00	0.05	1.87	2.20	0.68	0.37	1.58	4.21	12.89
1880	0.35	0.16	0.11	0.52	0.00	0.04	2.34	2.80	1.26	0.18	0.42	1.84	10.02
1881	0.16	0.10	2.91	0.67	0.42	T.	3.27	5.25	1.69	0.33	0.30	0.33	15.43
1882	2.53	2.04	0.00	0.28	0.45	0.47	1.64	3.34	2.57	0.39	1.55	0.00	15.20
1883	0.31	0.63	2.33	0.86	0.15	0.09	3.20	3.26	0.33	0.43	T.	4.54	16.13
1884	0.25	6.55	5.51	1.62	1.45	0.32	1.33	1.57	0.99	1.42	0.16	5.58	26.75
1885	0.08	0.46	1.47	0.62	0.37	0.07	2.53	1.24	0.11	0.38	2.46	0.32	10.11
1886	5.99	1.15	3.04	1.18	0.03	0.00	0.61	4.41	0.46	0.23	1.68	T.	18.78
1887	T.	3.12	T.	2.57	0.43	0.57	2.64	0.71	4.88	0.05	1.57	0.82	17.36
Mean..	1.40	1.74	1.62	1.05	0.62	0.19	3.13	3.02	1.16	0.56	0.72	1.53	15.47

*Interpolated.

Precipitation (inches and hundredths) observed at Fort Fetterman, Wyo., by assistant surgeons, U. S. Army.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1868	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.28	.....	.....
1869	0.39	0.52*	0.20	0.52	0.44	1.26	1.36	0.60	1.66	0.32	2.30	0.30*	9.87
1870	0.18	0.50*	1.34	1.20	2.26	0.88	0.62	2.46	1.36	0.40	0.02	0.46	11.68
1871	0.36	0.46	0.58	1.44	2.06	1.14	3.20	0.14	0.00	2.88	2.50	3.28	18.04
1872	0.20	1.12	0.10*	1.72	4.74	1.54	0.94	1.60	0.00	0.60	1.28	6.02	19.86
1873	0.54	3.40	0.90	1.70	6.04	0.40	2.17	1.02	0.26	1.04	0.50	0.24	18.21
1874	0.30	0.26	0.64	0.88	1.02	2.58	1.75*	0.96*	2.40	1.05	0.05	0.05	11.94
1875	0.52	0.25	0.11	1.44	1.50	0.93	2.52	0.54	0.46	0.42	1.00*	0.38	10.07
1876	0.34	0.20	2.78	0.00†	1.00	1.20	2.12	0.30	0.08	0.00	0.62	0.57	9.21
1877	0.54	0.12	3.42	1.10	2.86	0.50*	0.78	0.32	1.92	0.42	0.49	0.76	13.23
1878	0.13	0.16	3.28	3.72	2.72	1.23	1.05	0.57	1.86	1.40	0.46	0.94	17.52
1879	0.16	0.63	0.18	3.12	0.91	1.52	0.78	0.12	0.00	1.38	0.26	1.23	10.29
1880	0.13	0.69	0.35	1.06	1.20	1.39	0.77	2.09	0.60	0.57	0.74	0.52	10.11
1881†	1.31	0.50*	2.30	2.70	5.90	1.07	4.70	1.80	4.20	2.50	1.60	2.00	30.58
1882	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean..	0.39	0.66	1.24	1.58	2.51	1.20	1.75	0.96	1.14	1.00	0.86	1.29	14.66

† Measurements in 1881 probably forty per cent. in error. * Interpolated.

Precipitation (inches and hundredths) observed by assistant surgeons, U. S. Army, and Signal Service observers at Fort Craig, N. Mex.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1855	0.00	0.00	0.12	0.10	0.10	0.21	2.31	0.57	2.98	0.07	1.43	0.00	7.89
1856	0.00	1.40	0.89	0.03	0.20	1.21	0.97	0.97	6.32	0.06	0.51	0.00	12.56
1857	0.70	0.52	0.00	0.07	0.16	0.50	2.38	3.59	3.79	0.92	0.00	0.80	13.43
1858	0.00	0.00	1.50	0.11	0.60	0.24	1.13	1.42	0.04	0.00	0.00	0.19	4.63
1859	0.00	0.00	0.05	0.00	0.00	1.17	7.43	11.87	2.39	0.50	0.20	0.97	24.58
1860	0.16	9.99	0.00	0.39	0.00	.....	.....	0.54	0.81	0.00	0.12	0.42	.....
1861	1.35	0.10	0.00	0.04	0.26	0.87	2.10	3.03	2.90	0.00	0.00	0.00	10.65
1862	0.22	0.00	0.37	0.00	0.00	0.06	.....	.....	4.44	8.06	2.38	.....	.....
1865	.....	0.75	.....	0.04	0.16	.....	1.74	1.35	0.59	.....	0.00	0.85	.....
1866	0.03	0.01	0.87	0.16	0.08	.....	.....	.....	1.09	0.03	0.02	.....	.....
1867	0.15	0.00	0.40	0.00	.....	.....	.....	.....	0.57	1.17	0.86	0.48	.....
1868	0.16	0.00	0.02	1.08	0.33	0.01	5.06	5.53	3.40	0.00	1.49	0.36	17.44
1869	0.68	0.49	0.23	0.26	0.24	1.74	0.42	4.32	0.00	0.48	2.02	0.42	11.30
1870	0.00	0.10	0.00	0.10	0.00	0.43	2.45	3.61	1.00	1.05	0.04	0.36	9.14
1871	0.23	.....	.....	.....	.....	.....	.....	1.13	2.33	0.69	0.00	0.00	.....
1872	0.01*	0.70	0.00	0.07	0.11	1.15	2.50*	1.50*	0.70*	0.52	0.02	0.60	7.88
1873	0.02	0.16	0.40	0.18	0.13	1.21	0.10	1.80	1.35	0.07	0.39	0.04	5.85
1874	0.73	1.14	0.99	0.74	0.32	0.52	0.46	1.50	0.45	0.69	0.53	1.01	9.08
1875	0.02	0.36	0.04	0.00	2.03	1.47	4.26	0.89	3.88	0.00	0.16	0.20	13.31
1876	0.44	0.07	0.35	0.00	0.48	0.76	2.08	2.46	2.72	1.66	0.58	0.08	11.68
1877	0.18	2.43	0.10	0.94	0.46	0.00	2.77	1.41	1.55	1.18	0.12	0.58	11.72
1878	0.46	0.02	0.78	0.22	T.	0.10	1.70	1.41	0.08	0.00	0.18	0.13	5.08
1879	0.65	0.30	0.00	0.12	0.00	0.08	2.05*	1.24*	1.00*	1.58*	0.15*	0.59*	7.76
1884	1.10	0.04	0.09	0.03	0.19	0.37	0.42	2.69	1.29	1.96	0.94	0.88	10.00
1885†	0.28	0.17	1.02	0.44	0.82	0.97	2.27	1.78	0.06	0.09	0.20	1.15	9.25
1886†	0.13	0.38	0.06	T.	0.00	0.29	2.05	3.32	5.67	1.15	T.	T.	13.05
1887†	T.	0.46	T.	0.06	0.40	0.64	1.27	1.94	2.12	0.85	0.03	0.11	7.88
Mean..	0.30	0.41	0.33	0.20	0.26	0.68	2.18	2.49	1.98	0.88	0.46	0.41	10.67

*Interpolated. †Record from Lava, N. Mex.

Precipitation (inches and hundredths) observed at Fort Mojave, Ariz., by assistant surgeons, U. S. Army.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1869	0.30	1.10	0.15	T.	T.	T.	0.00	T.	0.00	0.14	0.74	0.06	2.49
1870	.....	T.	0.02	0.00	0.00	0.00	0.71	1.90	0.00	0.78	0.00	0.27	.....
1871	0.00	0.02	0.00	4.05	0.00	0.00	0.66	0.00	0.00	0.10	0.00	0.03	4.86
1872	0.00	0.10	0.00	0.20	0.00	1.00	0.00	0.90	0.00	0.00	0.00	0.10	2.30
1873	0.00	0.80	0.10	0.10	1.20	0.00	0.00	3.80	T.	0.00	0.50	2.80	9.30
1874	0.10	5.00	0.20	0.10	0.90	0.00	0.70	0.40	0.00	2.00	2.00	0.20	11.60
1875	1.90	0.00	0.40	0.10	T.	0.00	0.35	0.10	0.10	0.00	0.15	0.00	3.10
1876	1.90	1.25	0.60	0.10	0.00	0.00	0.86	0.19	0.33	0.01	0.00	0.00	5.24
1877	0.26	0.57	0.01	0.03	0.38	0.00	0.12	0.20	0.00	0.00	0.00	1.60	3.17
1878	0.22	2.10	.....	0.06	T.	T.	T.	0.80	0.11	0.00	0.42	0.01	3.72
1879	0.30	0.80	0.00	0.08	0.00	0.00	T.	0.72	0.00	0.90	0.30	0.24	3.34
1880	1.00	0.00	0.00	0.00	0.00	0.00	T.	*0.71	0.07	0.00	0.00	0.38	2.25
1881	T.	0.00	0.75	0.71	0.01	0.00	1.80	0.30	0.14	T.	0.00	0.00	3.71
1882	*0.66	0.66	0.00	0.26	0.00	0.08	*0.18	T.	.....	0.04	0.08	0.00	.....
1883	0.16	0.54	.....	0.22	0.02	0.07	0.15	T.	0.42	0.10	0.00	1.23	.....
1884	0.00	2.80	0.64	0.67	0.29	0.00	T.	T.	0.00	0.07	0.00	5.69	9.26
1885	0.00	0.00	0.18	0.30	T.	0.00	0.00	T.	0.00	0.00	T.	1.70	0.02	2.20
1886	1.50	0.36	0.92	0.84	0.00	0.00	T.	1.86	0.00	0.00	0.28	.....	.....
1887	.....	1.44	T.	.....	0.25	T.	0.25	1.62	T.	0.46	0.35	0.80	.....
1888	0.95	0.34	1.66	T.	0.00	0.00	0.18	T.	0.00	0.86	6.16	4.20	14.35
Mean..	0.51	0.89	0.31	0.41	0.15	0.06	0.30	0.68	0.06	0.27	0.63	0.93	5.39

*Incomplete.

Precipitation (inches and hundredths) observed at Camp Lowell (Tucson), Ariz., by assistant surgeons, U. S. Army.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1867	.....	.....	.....	.....	0.00	0.00	2.90	1.40	0.60	T.	.....	1.70	.....
1868	0.57	0.57	0.30	1.09	1.00	0.00	3.34	0.67	3.83	0.25	0.32	0.50	11.54
1869	1.09	1.58	0.70	T.	0.00	0.35	2.49	6.31	0.30	0.03	1.01	0.83	14.69
1870	0.02	0.20	0.03	0.16	0.00	T.	2.82	2.04	T.	0.00	0.00	0.94	6.21
1871	0.52	0.64	0.16	0.04	T.	0.40	1.02	3.70	2.00	T.	0.21	.....	.....
1872	0.54	0.12	0.00	0.05	0.01	0.26	3.94	3.81	3.06	0.40	0.00	1.39	13.58
1873	0.00	0.69	1.01	0.00	T.	0.00	0.08	2.73	0.62	0.00	1.32	0.97	7.42
1874	1.76	1.66	1.19	0.43	0.07	0.00	4.82	1.93	0.00	1.08	0.92	0.37	14.23
1875	0.37	1.22	0.00	0.09	0.00	0.20	4.22	2.09	2.39	0.00	0.05	0.53	11.16
1876	0.21	0.27	1.14	T.	T.	2.05	4.83	2.70	1.95	2.65	0.25	T.	16.05
1877	0.95	1.45	0.12	0.88	0.42	0.00	0.86	0.34	1.76	0.68	0.00	2.38	9.84
1878	0.12	1.12	1.06	0.48	0.00	0.16	0.60	7.88	0.14	0.00	2.30	0.52	14.36
1879	1.54	2.56	0.18	0.00	0.00	0.00	2.50	1.26	1.12	0.80	0.72	0.70	11.38
1880	0.62	0.00	0.64	0.16	0.00	0.20	1.88	3.64	0.38	0.12	0.00	1.06	8.70
1881	0.20	0.12	0.94	0.67	0.00	0.00	3.62	.....	2.04	1.26	0.00	0.30	.....
1882	2.30	1.90	0.94	0.30	0.32	1.54	1.18	3.60	0.38	0.00	1.48	0.12	14.06
1883	3.02	1.20	1.06	0.00	.....	.....	.....	.....	.....	0.78	0.48	3.18	.....
1884	4.74	5.23	2.90	0.08	.....	.....	.....	.....	.....	.....	.....	.....	.....
1886	.....	.....	1.12	0.14	0.00	0.00	T.	1.24	1.04	0.12	0.12	0.10	.....
1887	0.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean..	1.03	1.21	0.75	0.25	0.11	0.30	2.42	2.83	1.27	0.45	0.54	0.92	11.79

Table of miscellaneous meteorological data for June, 1889—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches. Mean actual.	Pressure, in inches. Mean reduced.	Pressure, in inches. Monthly range.	Temperature of air, in degrees Fahrenheit. Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.	Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall. 8 a. m.	Days with rainfall. 8 p. m.	Average cloudiness, tenths.	Temper'ture data since opening of station. Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
New England.					64.8	+ 1.4									3.23	+ 0.06																	
Eastport	53	29.92	29.98	0.93	56.9	+ 0.9	81	64.7	44	49.1	31	6	50.8	86.0	2.85	— 1.05	4,454	sw.	24	w.	20	7	12	11	15	3.0	2.6	17	88	1888	30	1875
Portland	99	29.87	29.97	0.93	64.0	0.0	84	71.6	46	56.3	29	5	57.2	80.9	3.26	— 0.14	5,441	s.	30	s.	2	7	7	16	12	4.7	6.0	18	96	1888	42	1875
Manchester	247	29.74	30.00	0.93	67.4	.....	88	77.0	42	57.7	29	4	57.6	74.2	3.04	.....	3,231	sw.	19	nw.	28	6	15	8	13	5.3	6.4	3	96	1888	41	1887
Northfield	871	29.04	29.96	0.92	62.5	.....	85	72.2	34	52.8	33	8	55.7	77.6	5.02	.....	5,434	s.	40	nw.	9	2	9	19	19	7.1	7.5	3	89	1888	34	1889
Boston	125	29.88	30.01	0.91	69.2	+ 3.2	87	77.0	50	61.3	28	3	60.8	79.3	3.31	+ 0.34	7,047	sw.	32	s.	1	4	14	12	10	5.6	6.7	19	98	1874	42	1884
Nantucket	14	30.03	30.04	0.90	63.6	.....	76	69.0	52	58.2	18	5	59.8	88.6	3.45	.....	6,484	*	28	ne.	19	10	11	9	8	4.8	4.9	3	80	1888	43	1888
Wood's Holl	22	30.03	30.05	0.89	63.2	.....	77	68.4	50	58.1	22	4	59.1	90.2	1.96	— 0.69	10,333	sw.	60	sw.	17	8	13	9	6	4.1	4.7	12	85	1876	40	1876
Vineyard Haven	.....	.....	.....	.....	68.4	.....	88	76.7	50	60.0	27	5	.....	.....	2.35	.....	.....	sw.	.....	.....	...	10	12	8	7	.....	...	3	92	1888	46	1887
Block Island	26	30.02	30.05	0.89	62.9	+ 0.9	76	67.9	52	57.9	19	5	59.5	90.5	2.84	— 0.58	10,467	sw.	36	e.	18	6	10	14	7	4.0	5.0	9	83	1888	46	1884
Narragansett Pier	22	.....	.....	.....	66.1	+ 1.1	85	74.7	47	57.6	27	7	.....	.....	4.35	+ 1.90	.....	sw.	.....	.....	...	5	15	10	9	.....	...	8	91	1884	41	1884
New Haven	107	29.92	30.03	0.88	67.4	+ 1.4	85	75.7	47	59.0	25	5	60.8	84.8	3.17	— 0.10	4,540	s.	24	se.	1	8	11	11	15	5.2	6.6	17	94	1888	41	1884
New London	47	29.97	30.02	0.89	67.0	+ 2.0	85	73.6	50	60.5	24	5	61.8	85.4	4.13	+ 0.78	4,744	sw.	29	se.	1	8	14	8	15	5.5	7.0	17	92	1888	43	1876
Mid. Atlantic States.					70.9	— 0.6									4.66	+ 0.92																	
Albany	85	29.92	30.01	0.89	68.4	— 0.6	88	77.5	47	59.4	28	9	61.2	82.8	6.43	+ 2.68	4,915	s.	38	se.	1	2	9	19	15	7.0	7.1	16	96	1888	40	*
New York City	185	29.84	30.03	0.86	70.4	+ 1.4	88	78.2	53	62.5	21	8	61.3	77.9	2.38	— 1.04	6,434	se.	36	se.	1	2	21	7	9	6.3	6.2	18	96	1888	47	*
Harrisburg	361	29.67	30.05	0.79	68.5	.....	87	76.8	50	60.2	26	3	59.4	76.6	7.18	.....	3,980	e.	30	nw.	16	5	15	10	20	6.4	6.4	.....	.....	.....	.....	.....
Philadelphia	117	29.93	30.05	0.78	71.4	+ 0.4	88	79.4	54	63.3	22	10	60.8	74.0	3.39	+ 0.16	7,580	sw.	46	se.	1	2	13	15	14	7.5	7.0	19	97	1888	47	1884
Atlantic City	53	30.00	30.05	0.76	66.2	— 0.8	88	71.2	50	61.2	26	4	61.4	87.4	3.13	— 0.08	8,031	sw.	46	se.	1	1	21	8	10	6.4	6.7	16	95	1887	45	1878
Baltimore	76	29.95	30.04	0.76	71.5	— 1.5	91	79.0	52	64.0	25	4	61.1	72.4	6.17	+ 2.10	3,900	sw.	26	s.	1	4	14	12	14	6.5	6.7	17	98	1874	49	1873
Washington City	112	29.93	30.05	0.77	70.8	— 2.2	90	79.1	48	62.4	29	7	62.2	77.2	5.01	+ 0.65	4,167	s.	25	nw.	10	9	14	7	14	6.7	6.3	19	102	1874	46	1873
Cape Henry	.....	.....	.....	.....	73.5	+ 1.5	91	80.5	58	66.5	23	4	.....	.....	6.89	+ 3.20	.....	sw.	.....	.....	...	1	10	19	14	.....	...	16	98	1887	48	1887
Lynchburgh	658	29.38	30.08	0.64	71.7	— 2.3	92	81.1	45	62.3	30	10	64.2	82.3	3.82	+ 0.14	3,054	nw.	22	nw.	28	0	18	12	19	6.6	6.9	17	98	1887	45	1889
Norfolk	69	30.00	30.07	0.66	73.9	— 1.1	94	81.3	55	66.5	23	5	65.2	77.6	4.75	+ 0.43	6,309	s.	34	se.	1	2	13	15	15	6.9	7.3	19	101	1880	53	*
S. Atlantic States.					77.6	— 1.1									7.75	+ 2.67																	
Charlotte	808	29.25	30.09	0.54	73.4	— 1.6	94	83.3	45	63.5	31	6	64.8	81.5	10.54	+ 5.95	3,529	s.	32	sw.	19	7	9	14	15	5.8	5.9	11	102	1887	45	1889
Hatteras	11	30.09	30.11	0.60	73.5	— 0.5	84	77.5	58	69.5	14	3	68.2	84.3	11.91	+ 7.27	8,865	s.	40	se.	1	11	7	12	14	5.7	5.4	9	91	1882	56	1884
Kitty Hawk	.....	.....	.....	.....	75.3	+ 2.3	98	86.8	54	63.8	34	10	.....	.....	8.05	+ 3.12	.....	sw.	.....	.....	...	3	12	12	13	.....	...	15	99	1880	52	1884
Raleigh	375	29.68	30.07	0.58	73.6	.....	93	83.1	49	64.1	29	7	64.4	76.4	10.44	.....	2,923	s.	17	nw.	22	5	9	16	9	6.1	6.7	3	102	1887	49	1859
Southport	.....	.....	.....	.....	76.2	+ 0.2	87	81.9	58	70.6	22	7	.....	.....	6.62	+ 2.89	.....	sw.	.....	.....	...	9	10	11	15	.....	...	14	96	1880	51	1884
Wilmington	52	30.03	30.09	0.58	75.5	— 0.5	93	81.5	58	69.5	20	4	69.0	84.2	6.03	— 0.19	5,004	sw.	27	s.	4	6	11	13	11	6.3	5.8	19	100	1880	50	1884
Charleston	52	30.04	30.09	0.56	76.8	— 2.2	95	83.5	51	70.2	24	7	68.0	79.5	5.96	+ 0.50	6,439	s.	35	e.	17	7	7	16	10	6.7	6.6	17	100	1887	51	1889
Columbia	.....	.....	.....	.....	76.8	.....	96	86.4	47	67.2	28	10	.....	.....	4.02	.....	.....	se.	.....	.....	...	1	10	19	14	.....	...	3	102	1887	47	1889
Augusta	183	29.91	30.10	0.46	78.1	— 0.9	98	88.9	46	67.3	31	8	67.0	76.3	4.02	— 0.26	2,889	se.	26	n.	25	5	13	12	10	5.6	7.3	17	103	1887	46	1889
Savannah	87	29.99	30.08	0.49	76.0	— 4.0	96	83.7	50	68.1	25	4	67.4	78.0	9.73	+ 2.75	5,490	s.	32	n.	19	6	7	17	12	5.7	6.6	19	100	1880	50	1889
Jacksonville	43	30.04	30.09	0.68	78.2	— 2.8	95	86.5	54	70.0	29	8	70.8	83.8	6.89	+ 1.13	5,110	se.	28	se.	28	7	7	16	13	5.4	4.5	18	100	1880	54	1889
Florida Peninsula.					79.7	— 2.3									5.88	+ 0.37																	
Cedar Keys	22	30.08	30.07	0.51	78.6	— 2.4	89	84.1	56	73.0	21	6	71.4	83.2	5.29	— 1.71	6,550	se.	43	e.	17	2	9	19	14	6.0	7.0	10	94	1880	56	1889
Jupiter	28	30.05	30.08	0.27	78.8	.....	92	85.0	64	72.5	21	5	73.8	84.0	9.80	.....	7,212	se.	35	s.	17	9	8	13	17	5.7	5.4	2	92	1889	64	1889
Key West	22	30.04	30.06	0.22	80.8	— 2.2	89	85.4	71	76.2	15	4	74.0	77.0	6.48	+ 2.45	5,941	e.	26	e.	16	6	13	11	11	5.4	5.9	19	100	1886	69	1887
Micco	.....	.....	.....	.....	77.0	.....	100	91.3	50	62.7	44	16	.....	.....	5.17	.....	.....	e.	.....	.....	...	1	7	6	8	.....	...	1	100	1889	50	1889
Titusville	12	30.08	30.09	0.46	78.3	.....	94	84.4	61	72.2	31	6	72.2	84.1	11.62	.....	9,023	se.	48	w.	19	6	13	11	19	4.9	5.4	3	94	1889	60	1888
Eastern Gulf States.					77.0	— 2.7									5.98	+ 0.46																	
Atlanta	1,139	28.90	30.08	0.42	73.2	— 2.8	90	82.3	39	64.1	31	12	61.6	72.9	5.03	+ 0.38	4,585	nw.	34	w.	19	7	17	6	13	5.3	6.0	11	97	1887	39	1889
Pensacola	56	29.98	30.04	0.41	77.2	— 2.8	90	83.0	55	71.5	18	5	70.3	80.2	4.04	— 2.78	6,348	sw.	26	sw.	21	7	14	9	11	5.1	5.0	10	97	1881	55	1889
Auburn	.....	.....	.....	.....	76.1	.....	92	84.3	46	68.0	28	7	.....	.....	2.71	.....	.....	se.	.....	.....	...	7	9	14	8	.....	...	2	93	1888	46	1889
Mobile	35	30.02	30.06	0.34	77.4	— 3.6	92	84.8	50	69.9	26	7	70.6	78.0	5.35	— 0.83	5,587	s.	36	sw.	7	1	21	8	9	5.3	6.1	19	100	1882	50	1889
Montgomery	217	29.83	30.06	0.46	78.2	— 1.8	94	88.3	48	68.0	32	7	63.4	67.3	4.02	— 0.88	3,416	se.	27	e.	14	8	9	13	14	5.4	6.1	17	106	1881	48	1889
Vicksburg	222	29.79	30.02	0.42	77.6	— 2.4	92	86.6	52	68.6	27	10	66.8	76.2	9.83	+ 5.89	3,970	se.	30	sw.	9	4	13	13	12	5.8	6.0	17	101	1881	52	1889
University	.....	.....	.....	.....	74.0	.....	90	82.2	47	65.9	29	3	.....	.....	8.39	.....	.....	n.	.....	.....	...	0	23	7	10	.....	...	3	99	1887	47	1889
New Orleans	52	29.97	30.03	0.33	78.2	— 2.8	92	86.0	58	70.3	21	10	68.6	79.2	7.62	+ 0.95	5,000	s.	24	n.	19	8	9	13	10	3.4	5.8	19	96	1881	58	1889
Port Eads	.....	.....	.....	.....	78.6	.....	89	83.7	61	73.6	15	6	.....	.....	6.42	.....	.....	sw.	.....	.....	...	2	18	10	11	.....	...	1	89	1889	61	1889
Western Gulf States.					76.9	— 3.7									5.50	+ 1.77																	
Shreveport	249	29.74	29.99	0.46	76.8	— 5.2	93	86.0	55	67.7	25	7	68.0	78.4	7.97	+ 4.50	3,875	s.	44	nw.	17	10	13	7	14	5.6	5.5	17	104	1875	55	*
Fort Smith	470	29.51	30.00	0.60	73.6	— 4.4	94	83.6	50	63.6	29	8	63.8	75.6	5.37	+ 1.15	2,755	se.	36	sw.	8	9	14	7	17	4.6	4.4	8	101	1882	50	*
Little Rock	309	29.67	29.99	0.55	73.6	— 4.4	91	82.1	51	65.0	26	2	64.8	76.6	3.07	— 1.21	3,593	*	24	sw.	8	6	17	7	13	4.6	4.9	10	98	1882	51	1889
Corpus Christi	20	29.94	29.96	0.35	79.5	— 3.5	91	84.1	69	74.9	17	5	74.8	85.0	2.96	.....	9,034	se.	30	se.	7	0	20	10	9	5.7	6.5	3	95	1887	66	1888
Galveston	44	29.95	29.99	0.31	79.0	— 3.0	86	82.9	68	75.2	14	5	72.2	81.4	4.79	— 0.05	7,674	s.	30	se.	10	7	14	9	9	5.2	5.5	19	96	1875	64	*
Palestine	511	29.46	29.99	0.41	76.6	— 2.4	91	85.3	55	68.0	26	10	70.2	84.6	7.00	+ 3.77	3,306	s.	32	w.	17	11	13	6	15	7.3	4.4	8	91	1889	55	*
San Antonio	781	29.16	29.95	0.40	79.0	— 3.0	95	87.9	58	70.2	27	11	70.2	79.6	4.79	+ 2.45	5,347	se.	36	e.	17	0	18	12	11	9.0	5.8	12	103	1883	53	1877
Rio Grande Valley.					83.3	— 0.7									3.73	+ 1.08																	
Brownsville	57	29.89	29.95	0.34	82.0	0.0	91	88.5	68	75.6	18	9	75.4	84.4	4.43	+ 1.22	6,157	se.	38	s.	8	13	15	2	6	3.4	4.0	14	102	1878	63	1877
Rio Grande City	230	29.72	29.96	0.40	84.6	— 1.4	104	94.9	66	74.3	28	10	73.2	78.2	3.03	+ 0.95	4,678	s.	24	ne.	22	3	15	12	6	7.1	6.0	13	109	1883	62	1877
Ohio Val. & Tenn.					70.4	— 3.3									4.98	+ 0.66																	
Chattanooga	783	29.25	30.06	0.46	72.2	— 3.8	87	81.5	39	62.8	33	11	64.4	82.4	4.16	— 0.35	2,808	ne.	36	nw.	10	6	11	13	19	5.9	5.5	11	98	1887	39	1889
Knoxville	980	29.07	30.09	0.48	70.7	— 3.3	88	80.1	44	61.3	31	11	62.0	80.8	5.57	+ 1.27	3,075	sw.	28	w.	19	4	18	8	17	6.4	5.8	19	96	1887	44	1889
Memphis	349	29.60	30.03	0.51	74.6	— 3.4	92	83.3	50	65.9	27	7	63.1	72.8	7.39	+ 2.42	4,230	s.	33	sw.	29	11	12	7	13	5.1	4.6	17	100	1881	50	1889
Nashville	549	29.46	30.03	0.48	72.1	— 3.9	88	80.9	46	63.3	29	8	62.2	75.2	5.33	+ 1.04	3,478	se.	30	se.	16	7	14	9	14	4.9	5.5	19	99	1874	46	1889
Lexington	.....	28.95	.....	0.52	69.2	.....	88	77.1	43	61.3	24	8	60.2	76.8	3.49	+ 1.53	6,662	se.	48	sw.	9	3	12	15	16	6.6	6.5	2	98	1888	43	1889
Louisville	551	29.45	30.03	0.57	70.6	— 3.4	93	79.5	44	61.6	29	8	60.0	71.8	5.76	+ 1.53	4,309	sw.	26	sw.	9	8	14	8	18	5.5	6.5	17	100	1874	44	1889
Indianapolis	766	29.21	30.01	0.66	67.8	— 3.2	89	76.5	41	59.1	28	6	57.4	71.9	4.88	— 0.24	2,972	sw.	20	nw.	21	1	12	17	12	5.9	5.7	16	96	1888	41	1889
Cincinnati	628	29.36	30.03	0.58	69.6	— 3.4	88	77.9	39	61.4	27	6	58.3	69.0	4.03	— 0.45	4,223	sw.	32	sw.	14	1	16	13	13	6.0	6.2	16	98	1874	39	1889
Columbus	812	29.15	30.03	0.64	67.7	— 3.3	86	76.3	42	59.1	25	6	58.0	75.0	2.77	— 0.74	3,772	s.	24	sw.	24	4	13	13	14	6.9	6.6	11	97	1888	42	1889
Pittsburgh	847	29.13	30.00	0.69	68.2	— 2.8	87	76.1	46	60.4	24	7	56.8	70.4	4.93	+ 1.34	4,024	sw.	24	sw.	15	1	8	21	18	7.8	7.7	17	98	1874	39	1879
Parkersburgh	638	29.37	30.05	0.63	68.4	.....	87	77.0	42	59.9	32	4	60.7	78.4	4.03	.....	3,283	sw.	25	s.	16	5	15	10	18	5.9	6.4	1	87	1889	42	1889
Lower Lake Region.					63.9	— 2.3									4.62	+ 0.90																	
Buffalo	690	29.27	30.01	0.82	61.9	— 2.1	83	68.1	45	55.7	23	4	54.0	77.6	5.27	+ 1.96	7,097	sw.	40	sw.	5	4	16	10	18	6.8	5.8	17	92	1878	40	1879
Oswego	335	29.62	29.98	0.88	61.0	— 3.0	83	68.7	48	53.2	27	7	55.2	82.0	9.81	+ 6.64	5,652	w.	25	w.	6	6	8	16	16	6.3	6.5	19	98	1875	39	1885
Rochester	621	29.33	29.99	0.86	63.4	— 1.6	81	71.3	44	55.4	28	6	55.2	76.3	5.30	+ 2.12	6,908	sw.	32	w.	1	2	19	9	17	6.6	6.7	18	95	1888	36	1879
Erie	714	29.25	30.01	0.77	63.7	— 2.3	82	70.1	45	57.3	22	4	55.5	76.4	6.02	+ 1.98	7,185	sw.	35	sw.	7	3	9	18	18	6.0	6.5	17	91	1874	42	1879
Cleveland	678	29.29	30.01	0.72	65.4	— 0.6	88	72.7	41	58.2	27	6	56.0	73.0	1.65	— 2.48	5,563	sw.	26	s.	7	5	18	7	18	6.8	6.2	18	96	1874	40	1879
Sandusky	629	29.33	30.00	0.71	66.2	— 2.8	86	73.6	42	58.7	26	7	56.6	74.3	2.29	— 2.30	5,906	sw.	27	nw.	21	2	10	18	14	7.2	7.1	11	96	1885	42	1889
Toledo	673	29.29	30.01	0.71	65.5	— 2.5	85	73.8	42	57.2	29	8	56.3	76.0	3.20	— 0.34	6,578	sw.	36	nw.	16	3	8	19	16	7.8	8.7	19	99	1872	42	*
Detroit	662	29.28	29.99	0.76	63.8	— 3.2	86	72.3	42	55.2	29	5	55.4	78.6	3.28	— 0.40	6,076	sw.	30	sw.	7	1	15	14	10	6.5	6.2	19	94	1888	38	1875
Upper Lake Region.					58.3	— 3.0									3.72	— 0.32																	
Alpena	609	29.30	29.96	0.84	55.6	— 4.4	84	62.9	41	48.4	32	1	50.0	82.0	4.61	+ 0.89	5,701	se.	36	w.	19	7	7	16	20	7.0	6.5	17	97	1874	34	1881
Escanaba	608	.....	.....	.....	57.5	— 2.5	84	66.1	40	48.8	29	4	.....	.....	5.98	+ 1.84	.....	*	.....	.....	...	11	8	11	15	.....	...	16	88	1874	34	*
Grand Haven	620	29.31	29.98	0.77	59.0	— 4.0	85	66.2	40	51.9	23	4	52.8	82.2	4.21	+ 0.12	6,739	s.	30	s.	7	2	18	10	18	5.9	6.2	17	90	1888	39	1888
Lansing	883	29.06	29.99	0.78	62.6	.....	87	72.3	40	53.0	32	6	56.4	82.4	4.14	.....	3,911	sw.	24	sw.	7	1	17	12	14	7.5	7.1	3	96	1888	40	*
Manistee	615	29.30	29.97	0.78	56.4	.....	83	63.6	37	49.1	32	5	50.6	81.9	4.96	.....	4,537	sw.	24	s.	12	12	5	13	17	5.6	5.2	1	83	1889	37	1889
Marquette	672	29.23	29.96	0.78	55.6	— 2.4	87	64.1	38	47.0	31	3	48.6	78.2	3.15	— 0.72	5,175	nw.	25	w.	12	9	8	13	12	4.7	4.5	16	95	1879	31	1881
Port Huron	639	29.32	30.01	0.78	60.2	— 2.8	84	68.4	42	51.9	28	4	53.1	81.2	1.86	— 1.71	5,647	s.	32	w.	21	7	8	15	15	6.0	6.6	15	93	1888	37	*
Sault de Ste. Marie	642	29.26	29.95	0.82	55.4	.....	85	65.1	38	45.7	32	7	48.4	81.8	5.83	.....	4,317	s.	32	sw.	12	2	12	16	13	7.3	6.1	1	85	1889	38	1889
Chicago	715	29.22	29.98	0.73	62.3	— 3.7	86	69.5	42	55.1	26	5	54.2	79.2	2.93	— 0.93	5,614	sw.	28	nw.	19	1	13	16	12	4.8	7.8	18	96	1872	40	1875
Milwaukee	697	29.20	29.95	0.77	58.6	— 3.4	83	66.0	42	51.1	32	3	52.9	83.2	5.21	+ 1.34	4,614	n.	35	ne.	8	8	10	12	15	5.5	6.1	19	94	*	40	1885
Green Bay	616	29.31	29.98	0.77	60.4	.....	85	69.3	40	51.4	34	4	52.8	79.4	3.06	.....	5,210	s.	36	ne.	9	3	9	18	13	6.0	7.2	3	92	1888	38	1888
Duluth	672	29.23	29.96	0.72	57.5	— 0.5	80	65.5	43	49.5	30	4	45.9	67.6	1.85	— 3.35	4,198	ne.	23	ne.	1	6	13	11	7	4.8	6.0	17	92	1883	33	1885
Extreme Northwest.					63.8	— 0.4									1.10	— 2.33																	
Moorhead	926	28.94	29.94	0.65	63.7	— 0.3	90	77.6	35	49.8	40	13	50.8	64.6	0.96	— 3.24	7,407	s.	48	s.	23	14	8	8	9	4.2	2.9	9	100	1883	28	1888
Saint Vincent	804	29.04	29.91	0.67	62.8	+ 0.8	92	77.2	33	48.3	43	11	46.2	53.5	0.76	— 2.62	6,695	s.	38	s.	23	16	8	6	6	3.7	3.5	9	93	1887	25	1888
Bismarck	1,681	28.15	29.92	0.66	65.0	0.0	97	77.9	42	52.0	37	15	54.9	71.6	1.03	— 2.36	6,993	s.	46	s.	28	14	11	5	11	5.0	3.8	15	99	1883	31	1888

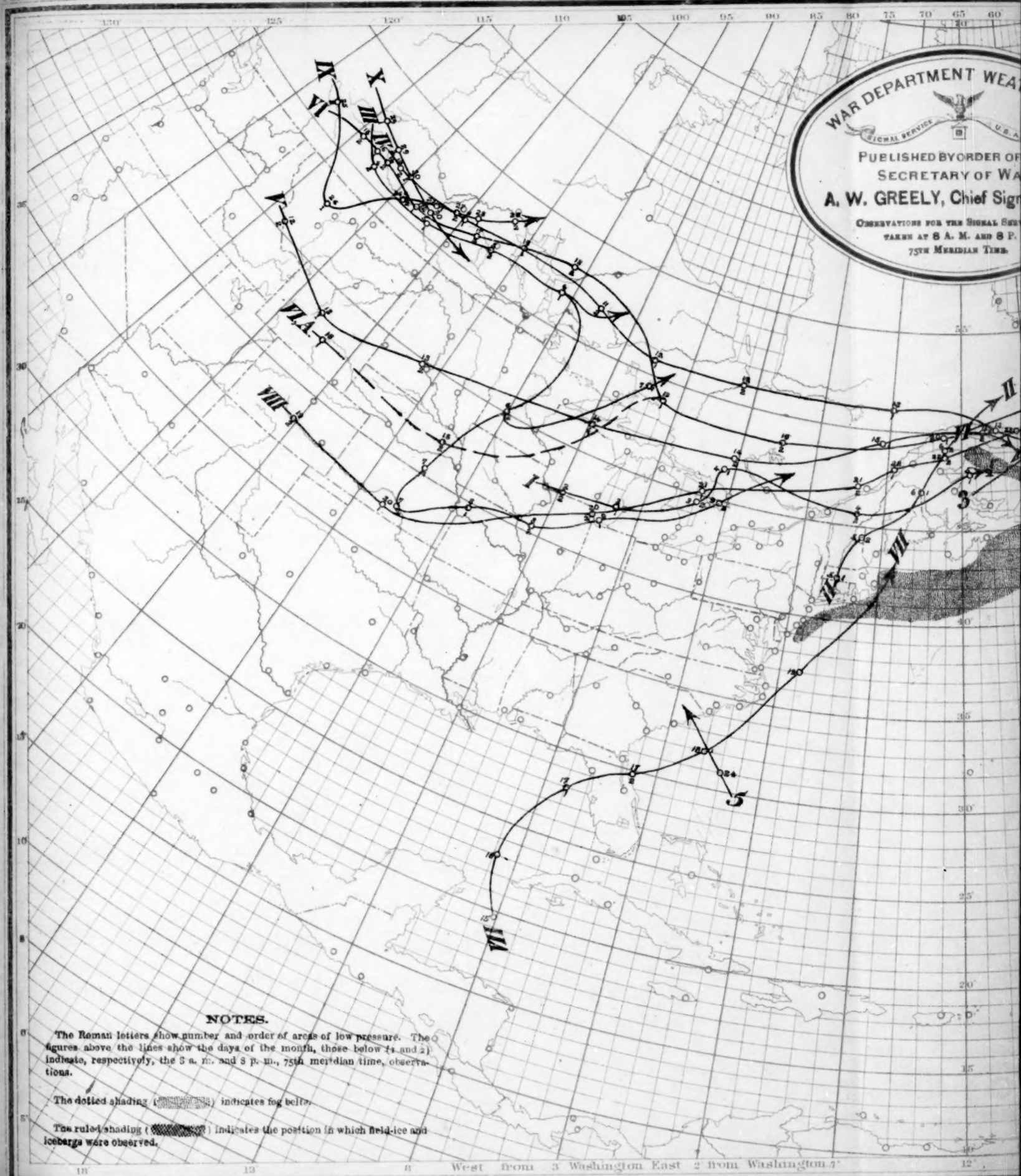
Table of miscellaneous meteorological data for June, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.							Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.		Wind.					Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths.		Temper'ture data since opening of station.				
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.			Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					8 a. m.	8 p. m.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
Ex. northwest—Con.																														
Fort Buford	1,900	27.90	29.89	0.71	63.7	— 2.3	101	78.4	38	49.0	49	15	43.8	52.8	1.03	— 2.28	5,864	nw.	36	nw.	28	5	17	8	9.5	1.5	11	106	1883	39	1883
Fort Yates	.....	.....	.....	.....	68.0	.....	99	82.5	43	53.5	42	20	.....	.....	1.74	— 1.13	.....	nw.	....	.....	...	5	23	2	6	.....	6	106	1883	33	1883
Upper Miss. Valley.					67.8	— 3.8									4.24	— 0.74														
Saint Paul	831	29.06	29.95	0.69	64.3	— 3.7	90	74.1	42	54.5	30	4	51.8	67.0	1.61	— 2.97	4,379	nw.	23	nw.	21	9	21	9	6.6	5.5	9	17	94	1874	36	1885
La Crosse	744	29.19	29.98	0.73	64.4	— 4.6	88	73.7	42	55.1	32	8	53.6	71.0	3.31	— 0.95	5,141	nw.	25	nw.	9	7	14	9	7.5	6.5	2	17	98	1874	40	1876
Davenport	615	29.33	29.98	0.78	67.0	— 3.0	89	76.3	39	57.6	29	7	57.3	73.0	5.59	+ 1.26	4,573	sw.	28	ne.	20	9	14	7	8.3	1.4	1	18	97	1887	39	1889
Des Moines	869	29.05	29.96	0.76	67.8	— 3.2	88	78.6	37	57.1	33	6	55.0	67.1	4.39	— 1.73	5,122	se.	36	sw	15	18	8	4	6.2	4.4	7	11	101	1886	37	1889
Dubuque	665	29.26	29.97	0.77	66.2	— 2.8	88	76.0	42	56.4	32	5	58.0	75.9	3.87	— 1.17	3,072	s.	24	w.	7	9	10	11	8.4	1.5	4	16	98	1874	40	1877
Keokuk	618	29.34	29.99	0.75	68.3	— 3.7	89	77.2	43	59.4	26	9	59.0	76.1	2.97	— 2.23	4,481	*	28	sw.	8	5	19	9	8.3	9.4	1	18	96	1873	43	1889
Cairo	359	29.64	30.02	0.59	70.8	— 4.2	90	78.8	46	62.8	27	4	61.8	77.6	8.07	+ 3.59	4,435	s.	43	sw.	17	4	10	16	10.6	37.1	18	96	1887	46	1889
Springfield, Ill	644	29.33	30.01	0.67	67.7	— 4.3	90	76.9	42	58.5	27	6	60.0	77.9	3.65	— 2.05	4,806	s.	26	sw.	17	5	14	11	11	5.4	7.3	10	96	1887	42	1889
Saint Louis	571	29.41	30.02	0.70	70.6	— 4.4	93	79.2	47	62.1	26	6	60.2	72.9	3.27	— 0.42	5,381	se.	44	w.	17	11	13	6	10.4	5.4	0	19	98	1881	47	1889
Missouri Valley.					68.7	— 1.7									2.76	— 1.93														
Kansas City	947	28.99	29.98	0.81	70.8	.....	89	80.1	50	61.4	27	10	61.7	76.6	3.11	.....	4,927	s.	26	nw.	8	9	13	8	9.4	1.4	8	1	89	1889	50	1889
Springfield, Mo	1,356	28.59	30.00	0.61	69.0	.....	90	78.3	48	59.6	26	10	59.9	78.4	5.80	.....	5,065	se.	42	nw.	20	3	21	6	15.4	9.5	9	3	97	1882	46	1882
Leavenworth	842	29.10	29.97	0.85	70.6	— 3.4	91	80.7	49	60.4	30	10	58.0	68.0	3.01	— 2.99	3,740	s.	28	s.	15	14	11	5	8.3	6.4	3	19	99	1875	45	*
Topeka	.....	.....	.....	.....	69.2	.....	93	81.7	43	56.7	35	13	.....	.....	3.08	.....	.....	s.	.....	.....	...	11	11	8	7	.....	3	100	1887	36	1888
Omaha	1,113	28.81	29.98	0.76	69.5	— 2.5	90	79.9	44	59.1	30	8	55.2	64.3	5.44	— 0.50	4,990	s.	32	n.	8	13	12	5	8.3	2.4	7	17	98	1881	42	1877
Crete	.....	.....	.....	.....	68.4	.....	91	80.2	43	56.6	33	16	.....	.....	2.78	.....	.....	e.	.....	.....	...	9	17	4	11	.....	2	93	1888	43	1889
Valentine	2,613	27.26	29.91	0.53	65.6	.....	92	77.4	43	53.7	41	8	53.0	66.2	2.99	.....	7,313	n.	40	s.	23	16	8	6	10.3	4.3	4	100	1888	40	1887
Fort Sully	1,600	28.24	29.91	0.63	67.8	— 1.2	99	80.3	46	55.4	42	13	53.0	63.2	1.64	— 1.85	6,708	se.	34	ne.	23	8	18	4	7.4	3.4	2	8	98	1889	34	1883
Huron	1,307	28.55	29.93	0.61	66.4	— 0.6	98	80.3	40	52.4	48	15	51.4	62.4	1.04	— 2.64	7,222	se.	39	s.	23	4	20	6	19	5	9.4	6.4	7	17	96	1876	33	*
Yankton	1,234	28.64	29.93	0.71	69.0	— 1.0	93	81.6	44	56.5	38	12	53.7	63.7	2.68	— 1.75	5,220	s.	52	w.	20	6	19	5	9.4	6.4	7	17	96	1876	35	*
Northern Slope.					68.0	+ 0.4									1.53	— 1.53														
Fort Assinniboine	2,720	27.13	29.90	0.64	62.6	+ 6.6	98	76.3	39	48.9	44	7	36.2	45.6	0.24	— 3.38	7,898	w.	60	sw.	26	10	8	12	5.5	1.4	5	7	101	1883	31	1883
Fort Custer	3,040	26.81	29.90	0.72	64.8	— 0.2	100	78.7	36	50.9	43	8	46.0	50.3	0.90	— 1.93	5,406	se.	39	w.	5	5	19	6	8.4	5.4	9	10	107	1883	33	1885
Fort Maginnis	4,340	25.58	29.91	0.53	59.2	— 0.8	91	71.0	38	47.5	38	8	39.8	46.2	0.61	— 2.55	7,148	nw.	49	nw.	26	15	5	10	6.3	8.4	8	7	91	1883	26	1888
Helena	4,069	25.82	29.90	0.63	63.4	+ 2.4	89	75.4	40	51.5	38	10	37.8	44.6	0.40	— 2.06	3,615	sw.	34	ne.	7	17	9	4	4.3	4.3	9	10	95	1880	31	1880
Rapid City	3,260	26.59	29.89	0.58	64.6	.....	95	76.7	43	52.6	41	7	44.2	52.1	2.97	— 1.52	6,547	nw.	36	n.	18	8	10	12	10.3	7.5	0	5	99	1888	35	1883
Cheyenne	6,105	24.08	29.95	0.43	59.0	— 3.0	87	72.1	31	45.8	35	8	40.7	55.6	3.67	+ 2.25	6,697	nw.	44	s.	19	4	16	10	12.2	8.6	3	17	97	1880	28	1876
Fort Laramie	.....	.....	.....	.....	64.8	.....	100	81.5	29	48.1	48	7	.....	.....	2.28	.....	.....	w.	.....	.....	...	17	5	8	9	.....	3	100	1888	29	1889
Fort McKinney	.....	24.98	29.89	0.30	61.2	.....	93	72.5	36	50.0	37	3	42.9	53.4	1.49	.....	7,360	n.	50	w.	8	7	10	13	14.4	3.6	1	2	93	1889	33	1888
Fort Washakie	5,580	24.49	29.96	0.53	59.6	.....	90	74.1	33	45.2	43	9	39.2	55.0	2.60	.....	4,011	sw.	36	sw.	22	14	10	6	11.2	3.4	8	4	91	1888	33	*
North Platte	2,841	27.07	29.96	0.60	66.6	— 2.4	91	79.0	42	54.2	40	11	53.6	69.0	1.95	— 1.49	6,342	se.	60	s.	6	5	17	8	14.4	4.5	1	15	101	1870	33	1876
Middle Slope.					69.0	— 2.6									3.16	+ 0.13														
Colorado Springs	.....	.....	.....	.....	62.2	.....	91	76.0	36	48.3	40	9	43.2	51.6	1.77	+ 0.79	.....	.....	.....	.....	...	15	10	5	13	1.7	3.0	2	95	1888	36	1889
Denver	5,281	24.80	29.94	0.48	64.3	— 2.7	92	77.3	37	51.3	37	8	41.0	52.6	1.88	+ 0.44	3,809	s.	34	n.	16	5	22	3	12.2	9.0	4	18	99	1873	37	*
Pueblo	4,724	25.29	29.91	0.57	68.7	.....	97	83.8	40	53.6	44	11	38.3	41.0	0.84	.....	4,864	e.	36	nw.	15	13	16	1	10.3	2.2	4	5	101	1885	44	1888
Concordia	1,384	28.52	29.95	0.74	70.5	— 1.5	91	81.2	50	59.8	31	8	58.5	69.4	2.40	— 0.46	4,720	*	28	se.	15	6	10	5	14.5	2.5	2	15	102	1880	40	1879
Dodge City	2,523	27.38	29.97	0.76	69.8	— 4.2	93	81.4	48	58.2	34	5	56.4	60.0	3.43	+ 0.05	8,199	s.	48	se.	18	10	9	11	14.9	4.7	1	94	1889	51	1889
Wichita	1,354	28.54	29.94	0.70	70.3	.....	94	80.5	51	60.1	31	6	61.0	77.0	7.89	.....	4,631	se.	34	nw.	18	10	9	11	14.9	4.9	7	1	94	1889	49	1886
Fort Reno	.....	.....	.....	.....	73.0	.....	92	84.1	51	62.0	30	12	.....	.....	7.12	+ 2.04	.....	e.	.....	.....	...	1	14	15	10	.....	6	101	1886	49	1886
Fort Supply	.....	.....	.....	.....	72.6	.....	95	83.6	50	61.6	35	6	.....	.....	3.82	— 0.09	.....	e.	.....	.....	...	5	12	13	9	.....	8	103	*	38	1882
Fort Elliott	2,650	27.25	29.92	0.68	71.4	— 2.6	96	83.1	49	59.8	34	12	56.9	67.4	1.64	— 1.88	9,173	se.	48	se.	3	10	9	11	5.4	9.5	5	10	100	*	44	*
Southern Slope.					73.9	— 4.6									4.38	+ 1.16														
Fort Sill	1,200	28.73	29.96	0.63	72.9	— 5.1	94	83.0	54	62.8	29	11	65.8	82.3	4.26	— 0.55	7,000	s.	84	e.	3	11	9	10	17.5	1.3	7	12	105	1881	47	1879
Abilene	1,748	28.17	29.95	0.55	74.9	— 4.1	94	83.9	58	65.9	26	8	64.6	73.9	6.36	+ 3.22	7,585	s.	48	n.	3	7	14	9	14.6	5.4	5	4	109	1886	56	1886
Fort Stanton	6,154	24.01	29.83	0.42	64.9	.....	91	78.4	37	51.4	43	8	38.8	46.7	2.51	+ 0.82	4,654	w.	36	nw.	7	3	23	4	4.4	1.4	9	6	92	1888	36	1884
Southern Plateau.					75.8	+ 1.1									0.26	— 0.17														
El Paso	3,796	26.16	29.83	0.34	80.8	— 1.2	104	94.3	54	67.3	33	15	38.5	29.2	0.28	— 0.23	6,888	nw.	45	ne.	23	16	13	1	2	2.6	3.0	11	113	1883	50	1881
Lava	.....	.....	.....	.....	73.8	.....	103	91.2	43	56.4	50	21	.....	.....	1.38	+ 0.81	.....	s.	.....	.....	...	9	15	6	7	.....	5	107	1888	43	1889
Santa Fé	7,026	23.33	29.92	0.37	64.2	— 1.8	86	76.7	37	51.8	33	10	32.2	36.4	0.63	+ 0.43	5,335	se.	48	n.	1	12	14	4	9.2	5.5	1	17	92	1881	33	*
Fort Apache	5,020	.....	.....	.....	71.2	+ 2.2	99	90.0	44	52.5	45	23	.....	.....	0.11	— 0.78	.....	sw.	.....	.....	...	14	8	8	4	.....	11	102	1887	33	1885
Fort Bowie	.....	.....	.....	.....	78.0	.....	94	88.8	56	67.3	28	14	.....	.....	0.09	— 1.27	.....	sw.	.....	.....	...	2	24	4	4	.....	6	104	1880	51	1885
Fort Grant	4,860	25.24	29.95	0.28	75.6	— 0.4	98	87.8	51	63.5	33	16	38.2	31.8	1.06	+ 0.40	5,028	nw.	34	se.	23	13	12	5	5.3	2.4	1	10	102	1883	49	1885
Fort McDowell	.....	.....	.....	.....	84.8	.....	112	104.2	50	65.3	52	29	.....	.....	0.06	+ 0.04	.....	sw.	.....	.....	...	20	6	4	2	.....	5	119	1887	50	1889
Fort Thomas	2,710	.....	.....	.....	83.2	+ 4.2	104	99.1	52	67.2	47	8	.....	.....	T.	— 0.32	.....	w.	.....	.....	...	12	17	1	0	.....	10	110	1887	43	1885
Fort Verde	.....	.....	.....	.....	76.3	.....	104	93.7	52	58.9	44	26	.....	.....	0.02	— 0.22	.....	w.	.....	.....	...	15	14	1	1	.....	12	110	1881	42	1887
Phœnix	.....	.....	.....	.....	86.3	.....	109	102.5	62	70.1	41	23	.....	.....	0.12	+ 0.03	.....	sw.	.....	.....	...	23	7	0	2	.....	13	119	1883	33	1885
Whipple Barracks	5,389	24.74	29.91	0.24	66.6	— 0.4	91	83.6	40	49.5	43	19	28.8	29.1	0.02	— 0.15	7,626	w.	42	ne.	12	18	12	0	1	1.7	2.0	14	102	1878	32	1880
San Carlos	.....	.....	.....	.....	82.4	.....	108	100.8	54	63.9	46	22	.....	.....	T.	— 0.30	.....	s.	.....	.....	...	9	17	4	0	.....	9	114	1887	43	1883
Wilcox	.....	.....	.....	.....	75.4	.....	103	95.6	47	55.1	51	28	.....	.....	0.13	— 0.06	.....	w.	.....	.....	...	10	7	4	4	.....	6	108	1884	34	1884
Yuma	141	29.62	29.76	0.31	85.6	+ 0.6	109	102.2	63	69.1	41	18	47.4	34.1	T.	0.00	4,526	s.	24	sw.	4	26	2	0	0	0.8	0.6	14	116	1883	56	1878
Keeler	3,622	26.22	29.75	0.34	78.9	+ 5.9	97	91.0	63	66.8	31	17	42.4	28.8	0.01	— 0.06	4,585	s.	35	nw.	8	25	5	0	1	0.4	2.0	5	99	1887	44	1887
Middle Plateau.					82.1	+ 3.4									0.12	— 0.50														
Carson City	.....	.....	.....	.....	66.6	.....	92	84.4	41	48.8	48	16	33.6	40.1	0.27	.....	.....	.....	.....	.....	...	21	7	2	2	1.2	2.8	2	92	1889	37	1888
Winnemucca	4,340	25.61	29.88	0.36	68.6	+ 6.6	93	84.6	41	52.5	46	23	21.4	22.1	0.11	— 0.70	7,385	w.	48	s.	13	17	6	7	2	2.1	3.5	10	98	1887	29	1880
Brock's	.....	.....	.....	.....	69.5	.....	97	87.9	39	51.1	52	15	.....	.....	1.85	.....	.....	w.	.....	.....	...	16	12	2	3	.....	2	97	1889	37	1888
Fort Du Chesne	4,900	25.02	29.86	0.44	67.6	.....	96	86.1	37	49.2	46	20	34.2	36.2	0.15	.....	4,070	s.	43	nw.	8	16	12	2	2	1.3	3.7	2	96	1889	32	1888
Salt Lake City	4,348	25.60	29.86	0.46	70.3	+ 2.3	97	83.3	47	57.3	38	13	34.4	29.4	0.01	— 0.82	4,402	se.	42	w.	15	2	13	7	0	1	2.3	3.3	16	99	1883	37	1875
Montrose	5,795	24.31	29.86	0.36	66.8	+ 1.7	90	81.3	36	49.3	44	22	29.8	30.4	0.28	— 0.00	4,988	se.	38	s.	26	21	5	4	6	1.3	4.0	5	93	1889	36	1889
Northern Plateau.					67.9	+ 2.0									0.57	— 1.12														
Boisé City	2,750	27.11	29.89	0.54	68.9	+ 2.9	98	84.9	45	52.9	45	15	34.2	35.0	0.19	— 0.99	3,175	w.	24	w.	4	15	11	4	1	3.0	3.8	12	99	1885	36	1882
Ashland	.....	.....	.....	.....	70.1	.....	101	88.3	43	51.8	47	14	.....	.....	0.34	— 1.52	.....	w.	.....	.....	...	21	6	3	2	.....	6	103	1887	36	1885
Fort Klamath	.....	.....	.....	.....	58.3	.....	86	77.6	30	39.0	50	14	.....	.....	0.55	— 1.05	.....	w.	.....	.....	...	19	7	4	3	.....	6	90	1887	26	*
Linkville	.....	.....	.....	.....	65.5	.....	92	81.8	38	49.2	44	14	.....	.....	0.64	— 1.04	.....	n.	.....	.....	...	18	8	4	4	.....	5	92	1889	25	1887
Spokane Falls	1,909	27.96	29.95	0.48	65.2	+ 1.2	91	79.9	40	50.4	44	10	33.6	38.8	0.39	— 1.70	3,776	sw.	26	sw.	22	9	13	8	3.4	3.5	0	9	95	1883	38	1887
Walla Walla	1,018	28.88	29.95	0.59	70.5	.....	100	84.1	47	56.9	47	10	37.8	36.2	1.33	— 0.41	4,227	sw.	31	sw.	4	18	10	2	2	2.9	3.4	4	100	1889	44	1886
N. Pac. Coast Region					69.7	+ 2.1									1.37	— 1.50														
Fort Canby	179	29.86	30.05	0.65	56.6	+ 0.6	83	61.6	49	51.7	23	2	51.2	85.2	1.36	— 1.59	7,917	n.	64	s.	28	15	3	12	9	5.4	4.3	6	91	1887	44	1887
Neah Bay	.....	.....	.....	.....	57.7	.....	74	66.9	40	48.5	26	12	.....	.....	2.30	— 2.70	.....	sw.	.....	.....	...	14	3	13	8	.....	5	74	1889	38	1886
Olympia	36	29.98	30.02	0.59	61.0	+ 2.0	90	75.2	40	46.9	44	7	51.2	74.4	1.32	— 0.16	2,732	n.	16	sw.	30	20	3	7	6	4.0	2.5	12	95	1878	36	1880
Port Angeles	14	30.00	30.01	0.56	55.0	— 1.0	76	64.3	37	45.7	34	8	48.2	83.2	0.94	— 0.43	3,773	w.	‡	w.	17	12	9	9	6	5.7	5.2	6	81	1886	35	1887
Pysht	.....	.....	.....	.....	56.2	.....	76	66.8	40	45.6	30	13	.....	.....	1.16	— 2.27	.....	w.	.....	.....	...	15	0	10	8	.....	5	77	1886	37	1884
Tatoosh Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.84	— 1.65	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	6	69	1887	45	1886
Astoria	38	.....	.....	.....	60.4	.....	88	68.8	46	52.1	30	6	.....	.....	2.75	— 0.20	.....	nw.	.....	.....	...	15	11	4	7	.....	5	88	1889	43	1885
Portland	80	29.92	30.01	0.59	66.0	+ 3.0	94	79.4	43	52.5	37	7	50.8	65.3	0.51	— 1.40	5,049	nw.	26	sw.	27	18	5	7	4.3	0.9	3.3	17	99	1876	39	1875
Roseburgh	523	29.45	30.01	0.43	68.0	+ 4.0	95	86.4	43	49.5	44	9	47.0	59.6	0.14	— 1.27	3,374	n.	24	ne.	19	21	5	4	4.3	8.2	9.9	12	97	1887	38	1880
Mid. Pac. Coast Reg.					70.0	+ 2.0									0.31	— 0.05														
Eureka	64	29.94	30.00	0.28	55.0	.....	66	59.9	45	50.0	17	5	50.6	87.5	0.37	.....	4,584	n.	30	n.	30	8	10	12	2	5.3	5.3	3	71	1888	40	1887
Red Bluff	342	29.49	29.83	0.40	79.7	+ 5.7	105	95.2	55	64.2	41	11	47.8	41.1	0.64	— 0.08	4,420	se.	26	nw.	19	27	2	1	2	1.2	1.4	12	105	*	47	1880
Sacramento	64	29.78	29.85	0.34	70.0	+ 1.0	96	84.7	52	55.5	38	8	56.0	68.2	0.25	+ 0.03	5,527	sw.	25	sw.	5	29	0	1	1	0.5	0.8	12	102	1883	47	1887
San Francisco	60	29.87	29.93	0.29	60.2	+ 1.2	75	66.3	52	54.2	20	6	52.0	81.2	0.03	— 0.26	7,871	sw.	32	sw.	24	3	24	3	1	7.2	4.0	19	95	1883	48	*
Point Reyes Light	.....	.....	.....	.....	55.4	.....	68	60.9	47	49.9	20	8	.....	.....	0.51	.....	.....	nw.	.....	.....	...	3	8	19	10	.....	1	68	1889	47	1889
S. Pac. Coast Region.					65.2	— 1.3									0.06	— 0.06														
Fresno	328	29.48	29.82	0.36	79.5	.....	106	96.7	55	62.3	42	25	49.0	43.0	0.00	.....	5,501	nw.	24	w.	27	24	6	0	0	0.4	1.9	2	106	1889	51	1886
Los Angeles	330	29.58	29.93	0.21	66.4	— 1.6	81	76.1	51	56.6	27	13	55.4	78.6	0.01	— 0.15	2,649	w.	14	sw.	6	1	28	1	0	7.4	1.6	12	104	1879	47	1887
San Diego	93	29.84	29.94	0.21	64.0	— 1.0	72	69.2	56	58.7	15	6	57.0	78.8	0.10	+ 0.04	3,988	w.	16	w.	1	10	9	11	1	9.5	4.8	18	94	1877	50	1884

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more directions, dates, or years. †Precipitation measured at the Boston Water Works; takes the place of the measurement at the Signal Office. ‡Self-register not working.

Form 106 C 1884

Chart I. Tracks of Areas of Low Pr


WAR DEPARTMENT WEA
SIGNAL SERVICE
U.S.A.
PUBLISHED BY ORDER OF
SECRETARY OF WA
A. W. GREELY, Chief Sign
OBSERVATIONS FOR THE SIGNAL SER
TAKEN AT 8 A. M. AND 8 P.
75TH MERIDIAN TIME.
West from 3 Washington East 2 from Washington.

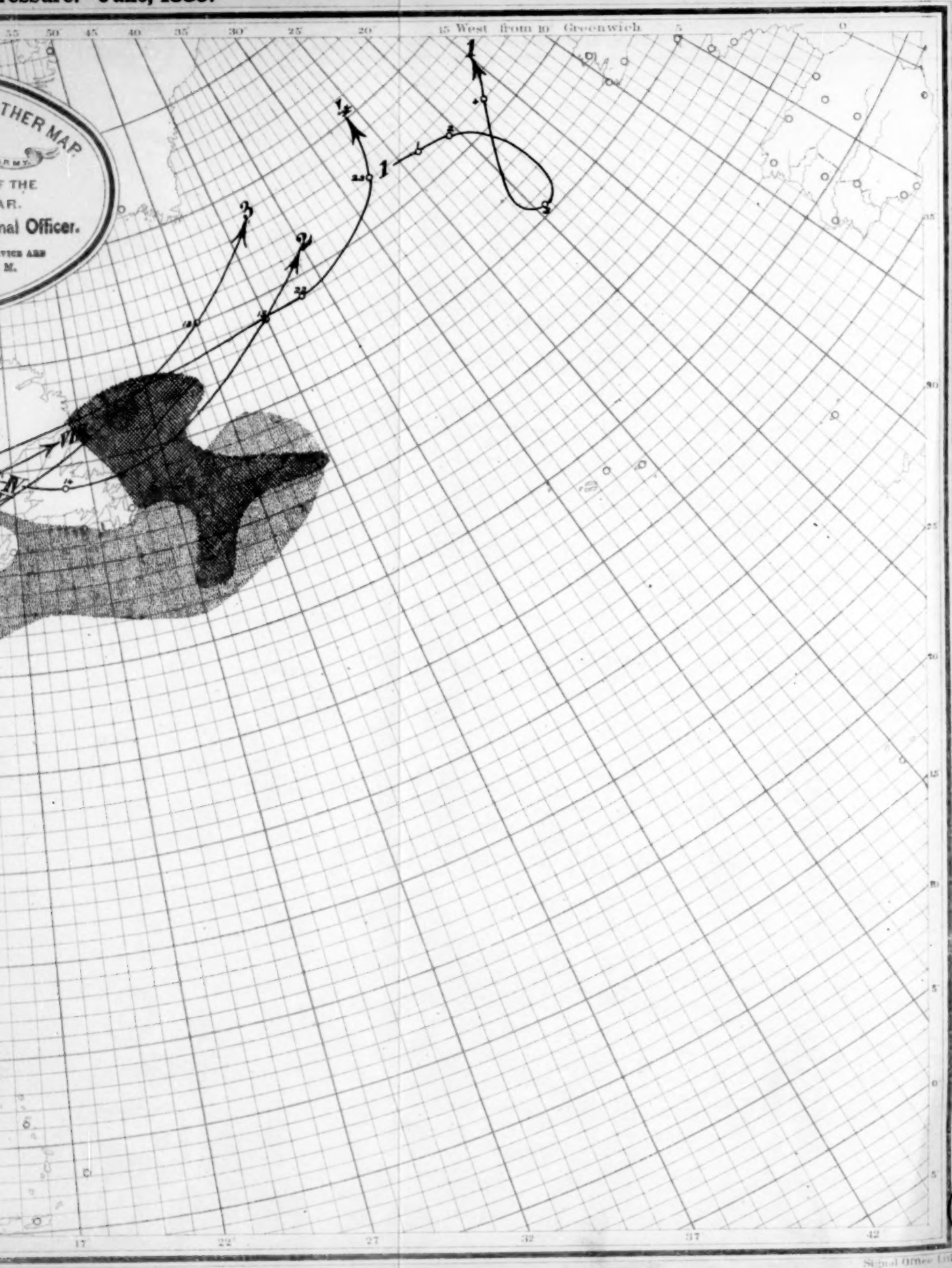
NOTES.

The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate, respectively, the 3 a. m. and 8 p. m., 75th meridian time, observations.

The dotted shading ( ) indicates fog belts.

The ruled shading ( ) indicates the position in which field-ice and icebergs were observed.

ressure. June, 1889.



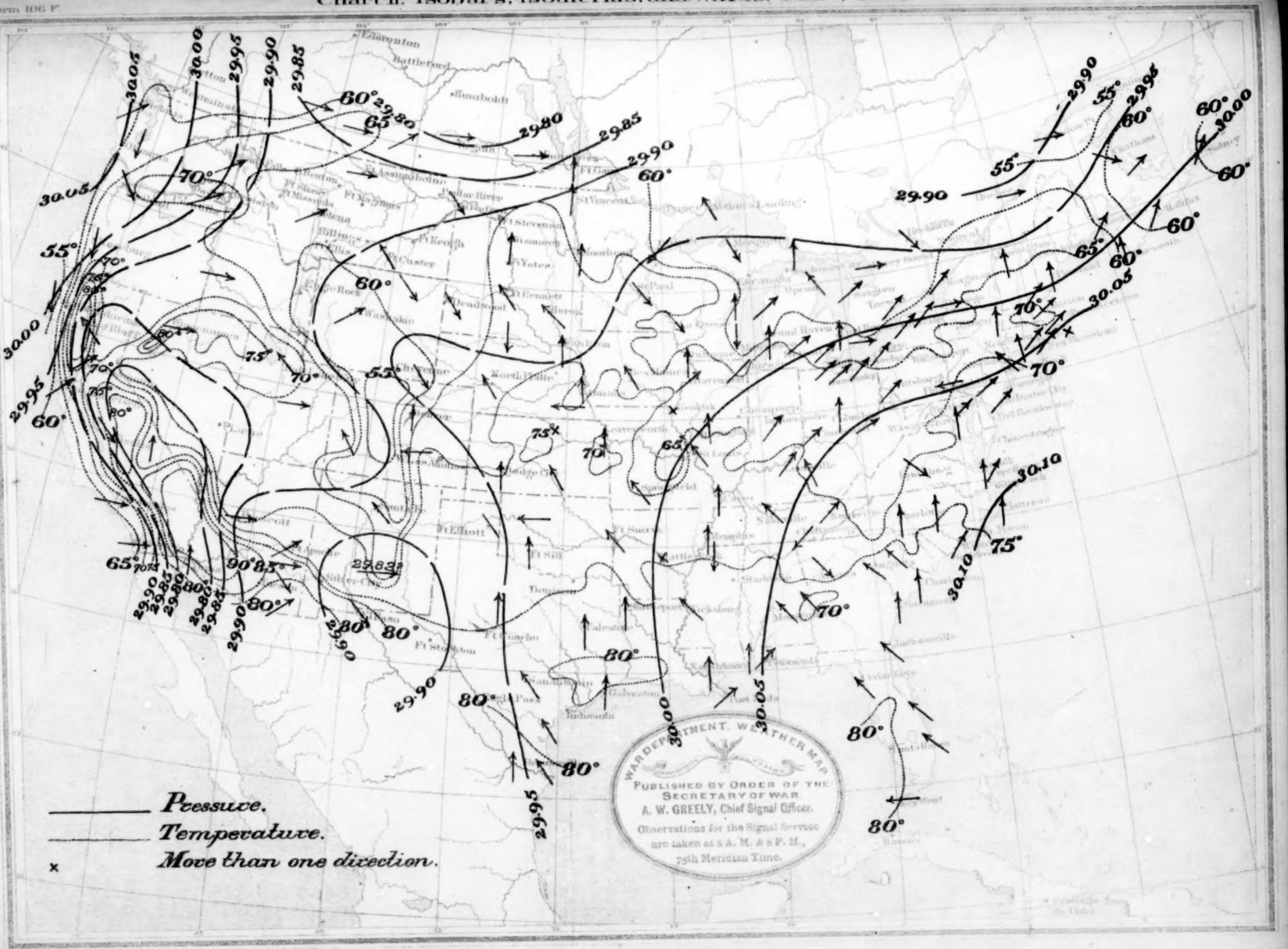
Signal Office Ph

UNIV. OF MICH.

Chart II. Isobars, Isotherms, and Winds, June, 1888.

Form 106 F.

Chart II. Isobars, Isotherms, and Winds. June, 1883.

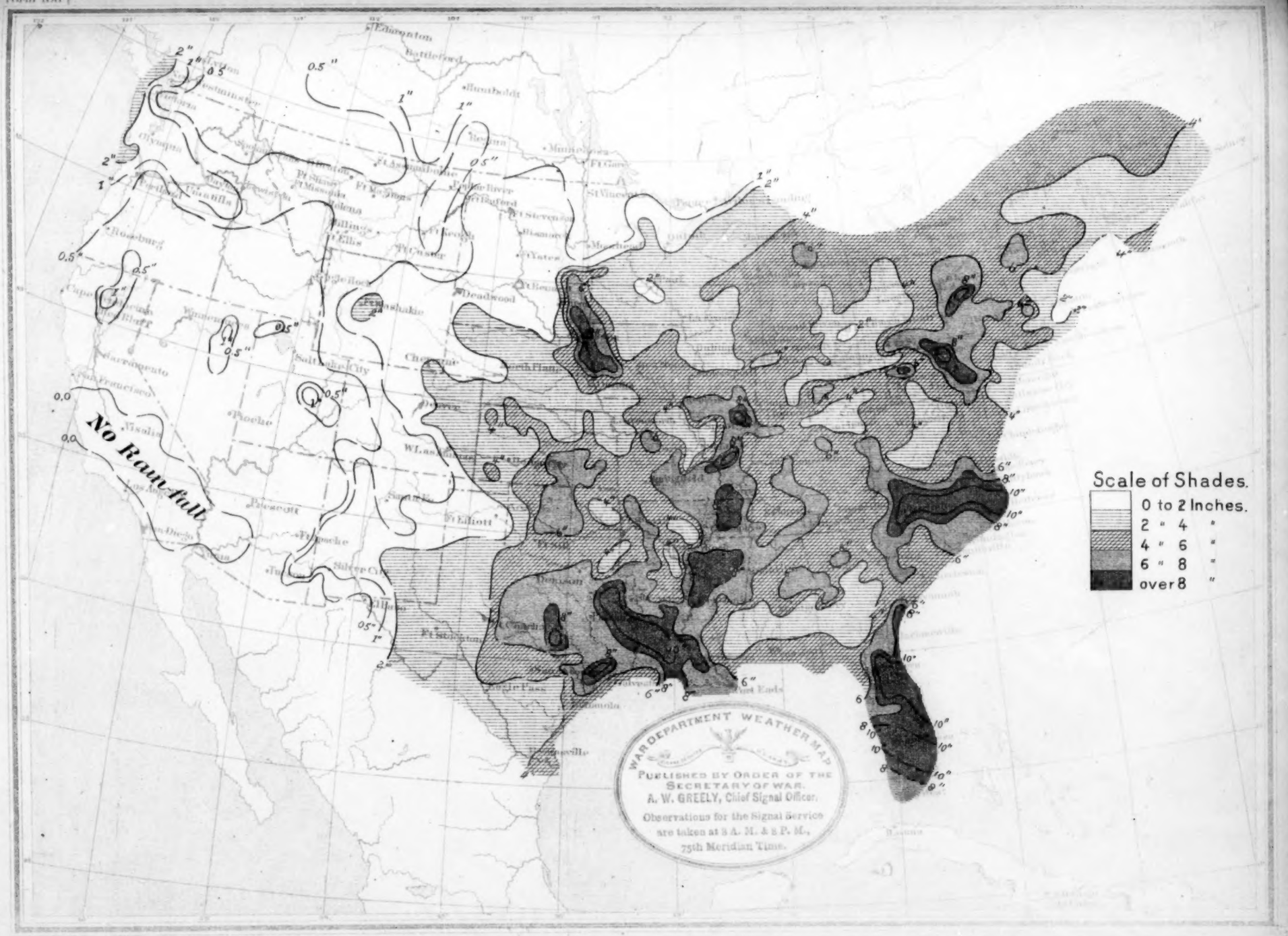

Pressure.
Temperature.
× Move than one direction.
WAR DEPARTMENT. WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 5 A. M. & 8 P. M., 75th Meridian Time.

Signal Office Lith.

Chart III. Precipitation, June, 1889.

Form 106 F

Chart III. Precipitation, June, 1889.


No Rain fall
Scale of Shades.
0 to 2 Inches.
2 " 4 "
4 " 6 "
6 " 8 "
over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 8 A. M. & 8 P. M., 75th Meridian Time.

Signal Office Litho

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Reports have not been received from those marked with an asterisk (*) in time to be used in the Review for June, 1889.

Place of observation and observer.

ALABAMA.
*Ashland, M. N. Manning.
Auburn, Ala. Weather Service.
Bermuda, Wm. Fowler.
*Butler, B. F. Gilder.
Citronelle, J. G. Michael.
Columbiana, W. D. Lovett.
*Elkmont, D. J. Moore.
*Gadsden, D. P. Goodhue.
Livingston, Prof. J. W. A. Wright.
Motes, A. M. Weiler.
*Mount Willing, W. M. Garrett.
New Market, Dr. Geo. D. Norris.
*Troy, Jas. Waldauer.
Valley Head, E. P. Nicholson, M. D.
Wiginia, M. D. Jones.
ARIZONA.
Antelope Valley, Mrs. J. H. Hamilton.
Cedar Springs, R. E. Norton.
Curtis, Dr. R. B. Tripp.
Flagstaff, M. J. Riordan.
Florence, A. T. Colton, C. E.
Globe, J. H. Hamill.
Holbrook, David Rope.
*Lochiel, Rochester Ford.
Mount Huachuca, J. W. Stump.
New River, J. F. Singleton.
*Phœnix, S. H. Campbell.
Teviston, Miss Mary Tevis.
Tombstone, S. C. Bogg.
Tucson, Edward L. Wetmore.
Williams, J. T. Ryan.
Willow Springs, F. A. Chamberlin.
Winslow, C. J. Dillon.
ARKANSAS.
Lead Hill, Silas C. Turnbo.
Little Rock, Arkansas Weather Service.
CALIFORNIA.
Anderson, Dr. A. Fouch.
Barstow, Geo. R. Gooding.
Berkeley, Prof. F. Soulé.
*Cayama, T. Saulsbury.
Centreville, Wm. Barry.
Colegrove, Seward Cole.
Crescent City, D. S. Shotwell.
Evergreen, S. Holland.
Georgetown, C. M. Fitzgerald.
Grass Valley, B. F. Berriman.
*Hanford, Dr. W. H. Miller; A. E. Grist.
Hydesville, E. T. Foss.
Jolon, T. T. Tidball.
La Grange, Jos. Dominica.
Lewis Creek, John Tuohy.
Los Banos, A. Widmann.
*Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
*Riverside, W. E. Keith.
Sacramento, S. H. Gerrish.
Salinas, Dr. E. K. Abbott.
*San Bernardino, A. K. Holt.
San Luis Obispo, J. E. Lewis.
Santa Barbara, H. D. Vail.
Santa Clara, A. Block.
Santa Maria, L. E. Blochman.
*Stockton, W. W. Trivett.
Susanville, T. B. Sanders.
Vacaville, G. O. Colburn.
Walla Walla Creek, J. Titcomb.
Walnut Creek, A. L. Bancroft.
Wheatland, Wm. Lumbard.
Willow, David Bentley.
COLORADO.
Bennet, I. S. Putnam.
Colorado Springs, Colo. Weather Service.
Coulter, Jesse E. Glick.
Delta, J. A. Curtis.
Denver, Rev. Wm. Forstall.
Fraser, L. D. C. Gaskill.
Fort Collins, Prof. L. G. Carpenter.
Grand Lake, Jas. Cairns.
Georgetown, W. A. Jayne, M. D.
Greeley, E. Bethel.
Palmer Lake, Thos. Gaddis, M. D.
Rocky Ford, F. Watrous.
CONNECTICUT.
Hartford, W. W. Ellsworth.
New Hartford, Rev. Wm. Goodwin.
Yelamtown, Rev. E. Dewhurst.
DAKOTA.
Brookings, Prof. Lewis McLouth.
Carrington, H. M. Durbrow.
Davenport, J. W. Leech.
De Smet, Thos. H. Ruth.
Gallatin, S. J. Pound.
Garden City, W. C. T. Newell.
Kimball, A. S. Stuver.
New England City, E. S. Clough.
Quin, Mrs. M. F. Goddard.
Parkston, John J. Swartz.
Redfield, W. H. Dempster.
Spearfish, J. H. Warren.
Spring Lake, A. Gould.
Steele, F. B. Hill.
Webster, Arthur Betts.
Wolsey, G. W. Frink.
Woonsocket, L. O. Libbey.

DELAWARE.
Kirkwood, Wm. Carnagy.
DISTRICT OF COLUMBIA.
*Kendall Green, Deaf and Dumb Institute.
FLORIDA.
Altamonte Sp'gs, M. E. Bingham.
Alva, Chas. E. Robins.
Archer, A. F. Wyman.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
Kissimmee, E. E. W. Brewster.
*Lake City, Dr. J. C. Neal.
Manatee, Mrs. Mary W. Broberg.
Matanzas, Mrs. B. E. Dupont.
Merritt's Island, Rev. J. H. White.
Tallahassee, Rev. Dr. W. H. Carter.
Villa City, J. Emory Round.
GEORGIA.
Andersonville, H. W. Bryant.
Athens, Prof. L. H. Charbonnier.
Diamond, Wm. Kinzey.
Duck, A. L. Gillespie.
*Erastus, J. K. Sewell.
Forsyth, Thos. G. Scott.
Hephzibah, R. L. Rhodes.
Marietta, G. S. Owen.
Milledgeville, S. A. Cook.
*Quitman, J. L. Cutler.
Thomasville, C. S. Boudurant.
Wolley's Ford, A. J. Julian.
IDAHO.
Lewiston, Robert Schleicher.
ILLINOIS.
*Charleston, J. B. Dazey.
Collinsville, Dr. J. L. R. Wadsworth.
Mattoon, Wm. Dozier.
Mount Morris, Wm. Feary.
Oswego, John S. Seely.
Palestine, John E. Templeton.
Pekin, Rev. J. E. Terborg.
Peoria, Dr. Fred. Brendle.
Philo, H. A. Burr.
Riley, John W. James.
Rockford, T. D. Robertson.
Sandwich, Dr. N. E. Ballou.
*South Evanston, Dr. M. D. Ewell.
Springfield, Ill. Weather Service.
Sycamore, Roswell Dow.
Windsor, A. H. Hatch.
INDIANA.
Butlerville, C. F. Hole.
Dana, J. E. Wright.
Huntertown, J. C. Hunter.
Jeffersonville, J. C. Loomis.
Laconia, Lafe Crozier.
La Fayette, Ind. Weather Service.
La Fayette, Purdue Institute.
Mauzy, Elwood Kirkwood.
New Providence, Prof. E. S. Hallett.
Point Isabel, Jas. F. Hood.
*Salem, J. W. May.
Scalesville, Urias Wilson.
Sunman, B. F. Ferris.
Vevay, Prof. Chas. Boerner.
INDIAN TERRITORY.
Caddo Creek, B. Leming, M. D.
Jimtown, M. M. Yeakley.
Lehigh, F. M. Madden.
IOWA.
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
Bancroft, H. N. Renfrew.
Blakeville, James Rogers.
Cedar Rapids, H. D. Olds.
Clarinda, A. S. VanSandt.
*Clear Lake, J. C. Wright, M. D.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
Cromwell, Harry C. Harrison.
Denmark, G. B. Brackett.
Des Moines, Adolphus Voegeli.
Dunkerton, J. W. Boyle.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
Fayette, R. Z. Latimer.
Fort Madison, Miss. L. A. McCready.
Gillett, H. L. Pierce.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Grinnell, Prof. S. J. Buck.
Hampton, E. C. Grenelle.
*Humboldt, Miss Florence Prouty.
Independence, Emil F. Wulfke.
Iowa City, Prof. A. A. Veblen.
Logan, Mrs. M. B. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers, M. D.
Monticello, H. D. Smith.
Mount Pleasant, Dr. Max E. Witte.
Mt. Vernon, Prof. Alonzo Collin.
Muscatine, J. P. Walton.
Osage, G. D. Pattingill.
*Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd.
Oskaloosa, O. H. Avey.
Sac City, Dr. Caleb Brown.

IOWA—Continued.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Webster City, C. M. Trumbauer.
Wesley, Wm. Ward.
KANSAS.
Allison, John J. Cass.
Bendena, G. Campbell.
Cawker City, A. G. Alrich.
Colby, C. E. Bennett.
Cunningham, E. Shaw.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. T. H. Dinsmore, Jr.
Englewood, C. D. Perry.
Fremont, E. Atkin.
Gibson, C. M. Bell.
Globe, Wm. Featherston.
Havensville, L. W. Dennen.
Independence, J. M. Altaffer.
La Harpe, Isaac S. Coe.
Lawrence, Prof. F. H. Snow.
Lebo, C. B. Jennings.
*Leoti, A. P. Barker.
Manhattan, C. P. Blachley.
Manhattan, F. J. Rogers.
Morse, R. P. Edgington.
*Rome, D. M. Adams.
Salina, J. H. Gibson.
*Santa Fé, Judge A. P. Heminger.
Sedan, J. W. Goodell.
Topeka, Kansas Weather Service.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran.
Wellington, John H. Wolfe.
Yates Center, F. R. Gray.
KENTUCKY.
Ashland, J. M. Ferguson.
Bernstadt, John de Planta.
Bowling Green, M. H. Crump.
Falmouth, F. G. Held.
Frankfort, E. C. Went.
Franklin, T. W. MacGill.
Louisville, Ky. Weather Service.
McHenry, M. G. Duncan.
Madisonville, T. J. Gill.
Millersburgh, Rev. C. Pope.
Mount Sterling, H. C. McKee.
*Owensborough, Watkins & Carter.
Owenton, J. S. Cox.
Pellville, Oscar Haynes.
Richmond, Prof. O. A. Kennedy.
Shelbyville, H. W. Prissler.
South Fork, A. B. Gilbert.
LOUISIANA.
Cameron, Hon. S. P. Henry.
*Crowley, A. B. Goodrich.
Emilie, Dr. L. D. Chauff.
Franklinton, Prof. J. M. Pugh.
Grand Coteau, Rev. C. M. Widman.
Houma, H. F. Belanger.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
*Mandeville, Hon. Alex. Band.
Marksville, Leon Molenar.
*New Iberia, Mrs. J. A. Gebert.
New Orleans, La., Weather Service.
*Port Eads, Miss Mattie Lawes.
*Shell Beach, E. Dechampas.
*Vidalia, L. P. Ault.
MAINE.
Bar Harbor, Joseph Wood.
Cornish, Silas West.
*Gardiner, Henry Richards.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.
MARYLAND.
Barren Creek Springs, Albert E. Acworth.
Cumberland, E. T. Shriver.
*Fallston, Prof. G. G. Curtis.
Frederick, McClintock Young.
Gaithersburgh, J. T. De Sellum.
Galena, Henry Parr.
Jewell, Jos. Plummer.
McDonogh, McDonogh Institute.
*Mt. St. Mary's, Mt. St. Mary's College.
Woodstock, Woodstock College.
MASSACHUSETTS.
Amherst, Miss S. C. Snell.
Amherst, Mass. Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observ'y, A. L. Rotch.
Cambridge, Harvard College Observatory.
Chestnut Hill, D. Fitzgerald.
*Deerfield, Rev. A. Hasen.
Dudley, Conant Observatory.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Holyoke, J. W. Doran.
Leicester, Arthur Kendrick.
New Bedford, Thos. R. Rodman.
Newburyport, F. V. Pike.
North Billerica, C. H. Kohlrausch.
Provincetown, John R. Smith.
Royalston, Miss Lizzie W. Chase.
Somerset, Elisha Slade.
Taunton, E. U. Jones, M. D.

MASSACHUSETTS—Continued.
Westborough, G. S. Newcomb.
*Williamstown, Williams College Observatory.
Worcester, J. B. Hall.
MICHIGAN.
*Benton Harbor, A. J. McCave.
Berrien Springs, F. A. Zerby.
Birmingham, S. Alexander.
Harrisville, Dr. D. W. Mitchell.
Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Lansing, Mich. Weather Service.
Marshall, G. H. Greener, M. D.
Mottville, J. A. Hartsler.
Thornville, John S. Caulkins.
Traverse City, S. E. Wait.
Ypsilanti, J. C. Bemiss.
Ypsilanti, C. S. Woodard.
MINNESOTA.
Le Sueur, L. B. Davis.
Minneapolis, Wm. Cheney.
Northfield, G. H. Alden.
Saint Paul, Minnesota Weather Service.
MISSISSIPPI.
Booneville, A. G. Smith.
Kosciusko, L. Heyman.
Logtown, C. D. Koch.
Louisville, B. T. Webster.
Macon, A. T. Dent.
*Palo Alto, W. H. Hill.
Pontotoc, C. W. Bolton.
Summit, J. N. Tennisson.
University, Mississippi Weather Service.
Waynesborough, W. S. Daries.
MISSOURI.
Conception, Rev. Fr. Paul.
Excelsior Springs, A. Reinisch.
*Fayette, Prof. T. Berry Smith.
Frankford, W. W. Vermillion.
Grand Pass, E. R. Graham.
*Lakenan, O. Ayres.
New Frankfort, G. W. Hawkins
Ozark, J. J. Brown.
*Pierce City, J. J. Spilman.
Princeton, Dr. Wm. Hirons.
Saint Louis, Missouri Weather Service.
*Warrenton, Prof. J. H. Frick.
Willow Springs, Capt. Wm. Hugh.
MONTANA.
Sheldon, Sarah E. Sheldon.
Virginia City, Eugene Stark.
NEBRASKA.
Ansley, P. Fowlie.
Creighton, George Roberts.
Crete, Nebraska Weather Service.
Crete, G. F. Gilbert.
Culbertson, G. D. Carrington.
David City, E. B. Taylor.
De Soto, Chas. Seltz.
Fairbury, Dr. I. Humphrey.
Falls City, A. B. Newkirk.
Fremont, Isaac E. Heaton.
Genoa, George S. Truman.
Hay Springs, Wm. Waterman.
Kennedy, Mrs. M. G. Ericson.
*Lincoln, University of Nebraska.
Marquette, John Ellis.
North Loup, E. W. Black.
*Plum Creek, G. F. Cain.
Stratton, J. B. Sline.
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.
Weeping Water, G. Treat.
NEVADA.
*Carson City, Chas W. Friend.
Carson City, Nevada Weather Service.
NEW HAMPSHIRE.
Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
North Sutton, C. E. Hosmer.
Shaker Village, N. A. Briggs.
Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough, | Lake Winipisseogee Cotton and Woollen Manufacturing Co.
NEW JERSEY.
Beverly, C. F. Richardson.
Egg Harbor City, H. Y. Postmn.
Jersey City, Wright Babcock.
Moorestown, Thos. J. Beans.
New Brunswick, N. J. Weather Service.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
*Vineland, Dr. O. H. Adams.
Woodbury, W. T. Wilson.
NEW MEXICO.
Albuquerque, S. M. Rowe.
Coolidge, B. S. Mullin.
Gallinas Spring, J. E. Whitmore.
Las Vegas, F. W. Chatfield.
Los Lunas, Richard Pohl.

NEW YORK.
Alfred Centre, F. S. Place.
Angelica, J. P. Slocum.
Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
*Barnes' Corners, W. C. Fawdrey.
Boyd's Corners, Thos. Manning.
Canton, Henry Priest.
Constableville, R. Sanford Miller.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Elmira, Gority Brothers.
Factoryville, T. P. Yates.
Fleming, Robt. Warwick.
Friendship, Jesse D. Rogers.
Geneva, Mrs. N. S. Yates.
Hess Road Station, C. H. Spaulding.
*Hudson, M. P. Williams.
Humphrey, Chas. E. Whitney.
Ilion, G. A. Trowbridge.
Ithaca, Cornell University.
Ithaca, N. Y. Weather Service.
Kingston, H. A. Stone.
*Le Roy, Prof. F. M. Comstock.
Lowville, W. Hudson Stephens.
Lyons, Dr. M. A. Veeder.
Middleburgh, F. X. Straub.
Newfane Station, F. B. Clark.
New York City, Central Park Observatory.
Nineveh, W. J. Barnett.
North Hammond, C. A. Wooster.
*North Volney, J. M. Patrick.
Number Four, Chas. Fenton.
Palermo, E. B. Bartlett.
Palmyra, L. D. Cummings.
Pendleton, W. D. Lovell.
*Penn Yan, Geo. R. Young.
*Perry City (near), W. H. Jeffers.
Potsdam, Peter Vilas; G. W. F. Smith.
Queensbury, De Witt C. Jenkins.
Salem, W. W. Hance.
Saranac Lake, Jas. P. Mills.
Savona, M. S. Collier, M. D.
Setauket, Selah B. Strong.
Somerset, J. W. Thurber.
South Canisteo, J. E. Wilson.
South Kortright, D. C. Sharpe.
Tannersville, H. M. Wilson, Jr., M. D.
Utica, Thomas Birt.
Wedgewood, O. F. Corwin.
White Plains, Prof. O. R. Willis.
NORTH CAROLINA.
Asheville, Dr. Karl von Ruck.
*Chapel Hill, Prof. J. W. Gore.
*Fayetteville, H. R. Horne.
Grover, F. H. Dover.
*Hot Springs, Dr. W. F. Ross.
Lenoir, Dr. R. L. Beall.
Mount Airy, J. W. Ashby.
Mount Pleasant, H. L. T. Ludwig.
*Morganton, P. P. Lorbacher.
Raleigh Thos. C. Harris.
Raleigh, North Carolina Weather Service.
*Rock Spring, T. J. Cates.
Soapstone Mountain, H. L. Kimrey.
*Southern Pines, Professor E. A. Martin.
*Statesville, W. A. Eliason.
*Wake Forest, Prof. E. G. Beckwith.
*Washington, J. M. Gallagher.
Weldon, T. A. Clark.
OHIO.
Bellevue, Wm. Sheffield.
Carrollton, P. M. Herold.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Collinwood, Wm. Smeed.
Columbus, Ohio Weather Service.
Demos, B. B. Ault.
Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Glasgow, W. Melane.
*Gracey, H. M. Scott.
Jacksonborough, Dr. J. B. Owsley.
Kent, P. W. Eigner.
Kenton, L. J. Demarest.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
North Lewisburgh, H. D. Gowey.
Orangeville, E. N. Hyde.
Portsmouth, Dr. D. B. Cotton.
Poland, Chas. Stewart.
*Salineville, J. W. Manning.
Shanesville, John Roth.
Shiloh, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Vienna, W. D. McCorkle.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.
*Winfield, W. H. Stahl.
Yellow Sp'gs, Miss Eliza G. Rice.
OREGON.
Albany, John Briggs.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for Monthly Weather Review—Cont'd.

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
OREGON—Continued.	TENNESSEE.	VERMONT—Continued.	FOREIGN—Continued.	NEW STATIONS—Continued.
Bandon, Geo. Bennett.	Ashwood, Rev. C. F. Williams.	East Berkshire, H. B. Lovering.	Guanajuato, Mexico, Meteorological Observatory.	Menardville, Tex., Louis Ba
East Portland, Dr. Geo. Wigg.	Austin, P. B. Calhoun.	Lunenburgh, Dr. Hiram A. Cutting.	Hamilton, Bermuda, Gen. Russell Hastings.	Beaver, Utah, Rev. J. D. Gillil
Eola, Thos. Pearce.	Cumberland Gap, A. A. Arthur.	Manchester, Rev. E. P. Wild.	Killisnoo, Alaska, Jos. Zuboff.	Nephi, Utah, W. R. May.
Grant's Pass, Jno. G. Jessup.	Milan, Dr. M. D. L. Jordan.	Newport, M. B. Trasher.	La Logia, Mexico, H. Patrick.	Ella, W. Va., Henry Resseger.
La Grande, J. K. Romig.	Nashville, State Board of Health.	Saint Johnsbury, F. Fairbanks.	Leon, Mexico, Prof. M. Leal.	Egion, W. Va., Julius Scherr.
*McMinnville, Prof. W. J. Crawford.	Riddleton, F. K. Fergusson.	Strafford, H. F. J. Scribner.	Mazatlan, Mexico, Leon P. Acosta	Gladesville, W. Va., S. L. Zinn.
Mount Angel, Rev. F. Barnabas Held.	TEXAS.	VIRGINIA.	Mexico, Mexico, Meteorological Observatory.	Kingwood, W. Va., J. E. Murd
Tillamook, A. P. Wilson.	Austin, Oscar Samosta.	Alum Springs, F. H. Campbell.	Monterey, Mexico, Dr. Wm. De Ryee.	Pleasant Hill, W. Va., D. Fitch nell.
PENNSYLVANIA.	Austin, Q. C. Smith, M. D.	Boiar, G. F. Eakle.	Montreal, Quebec, C. H. McLeod.	Seven Pines, W. Va., J. R. Shaver.
Altoona, Chas. B. Dudley, M. D.	*Baird, D. Richardson.	Bird's Nest, C. R. Moore.	New Westminster, B. C., Capt. A. Peele.	Rivesville, W. Va., J. T. Par
Aqueduct, D. M. Sheely.	Bear Creek Ranche, W. H. Potter.	Christiansburgh, H. D. Walters.	Port au Prince, Hayti, Prof. I. Scherer.	and F. F. Prickett.
Blooming Grove, John Grathwohl.	Belton, E. A. Sterling.	Dale Enterprise, L. J. Heatwole.	*Pueblo, Mexico, Catholic Institute.	Tannery, W. Va., G. H. Tremb
Blue Knob, A. H. Boyle.	Brazoria, H. Stevens.	*Marion, A. T. Lincoln.	Topolobampo, Mexico, Mrs. Lillian Whitehill.	*New stations in June*, 188
*Catawissa, Robt. M. Graham.	*Brenham, J. G. Sloan.	Petersburgh, Jas. M. Colson, Jr.	Zacatecas, Mexico, Jose A. y Berilla.	Luverne, Ala., J. O. Sentelle.
Cerry, Wm. Loveland.	Brownwood, J. F. Mayo.	Smithfield, J. R. Purdie.	*New stations in May*, 1889.	Ash Canyon, Ariz., J. S. Robb
Drifton, H. D. Miller.	Cedar Hill, J. P. Berry.	Spottsville, B. W. Jones.	Signal, Ariz., Wm. Koshland.	American Hill, Cal., T. L. Dwig
Dyberry, Theo. Day.	Cleburne, P. J. Norwood.	Summit, J. R. Sim.	Strawberry, Ariz., L. P. Nash.	Palmdale, Cal., Welwood Mur
*East Brook, L. E. Stunkard.	College Sta'n, Prof. J. H. Kinealy.	University of Virginia, James Wearmouth.	Volunteer Sp'gs, Ariz., W. J. Hill.	Sanborn, Dak., H. V. Sterl
Easton, Dr. J. W. Moore.	Colorado, Fred R. Blount.	*Variety Mills, J. H. Micklem.	Walnut Grove, Ariz., T. B. Carter.	Soda Sp'gs, Idaho, L. C. Eas
Edinborough, C. F. Sweet.	Columbia, J. S. Rogers.	Wytheville, Howard Shriver.	Iowa Hill, Cal., C. F. Macy.	Oklahoma, Ind. Ter., C. F. Sum mer.
Franklin, Joseph Bell.	Corsicana, E. L. Gibson.	WASHINGTON TERRITORY.	Amour, Dak., Jno. J. Angus.	Rago, Kan., D. S. Stratten.
Germantown, Thos. Meehan.	Corsicana, W. H. Hamilton.	Blakely, R. M. Hoskinson.	Alexandria, Dak., L. C. Taylor.	Earlington, Ky., J. B. Atkinso
Grampian Hills, Nathan Moore.	Decatur, H. D. Donald.	Vashon, Mrs. C. B. Carpenter.	Napoleon, Dak., Julius H. Hoof.	Springfield, Ky., W. U. Ray.
*Haverford, H. V. Gummere.	Forestburgh, J. N. Morris.	WEST VIRGINIA.	Roscoe, Dak., C. H. Spencer.	Winfield, La., J. M. McCain.
Le Roy, Geo. W. T. Warburton.	Fort Worth, Whit Dryden.	*Clarksburgh, R. T. Lowndes.	Point Peter, Ga., C. M. Witcher.	Gambrill's, Md., J. E. Moque.
*Meadville, David Logan.	Fredericksburgh, Arthur Striegler.	*Hartmonsville, W. C. Tabb.	*Lemhi Indian Ag'cy, Idaho, T. F. Maloney.	Nahant, Mass., Wm. D. Hodges.
Meshoppen, Stephen S. Jenkins.	Gainesville, D. F. Ragsdale.	*Parkersburgh, T. G. Field.	Guthrie, Ind. T., Morris Collar.	Fayette, Miss., J. N. Bedford.
Nisbet, J. S. Gibson.	Gallinas, Lum Woodruff.	*Rockport, R. D. J. Echols.	Eagle Grove, Iowa, C. A. Schaffter.	Ripley, Miss., E. N. Hunt.
Petersburgh, J. E. Rooney.	Galveston, Tex. Weather Service.	Tyler Creek, F. M. Swann.	Pointe à la Hache, La., F. C. Myers.	Brownville, Neb., G. D. Carrington
Philadelphia, Pennsylvania Weather Service.	Graham, A. B. Grant.	WISCONSIN.	Cumberland, Maryland, Howard Shriver.	Bingham, Neb., W. C. Wood.
*Philipsburgh, G. F. Dunkle.	Granbury, E. H. Snider.	Cadiz, B. C. Curtis.	Albion, Mich., Chas. E. Barr.	Hillsborough, N. Mex., J. H. Smith.
Pleasant Mount, J. D. Brennan.	Houston, A. Hutchinson.	Delavan, George L. Collie.	Fort Logan, Mont., Wm. Gaddis.	Red Cañon, N. Mex., R. H. Hill
Quakertown, J. L. Heacock.	Howe, W. M. Smith.	Embarrass, J. E. Breed.	Glendive, Mont., J. H. Ray.	Honeymead-Brook, N. Y., Jas. Hyatt.
Reading, C. M. Dechant.	*Huntsville, G. Buckingham.	Fond du Lac, J. C. Wedge.	Powder River, Mont., J. M. Graham.	Leipsic, Ohio, J. D. Hardeman.
Salem Corners, T. B. Orchard, M. D.	*Ingersol, E. T. Page.	*Fredonia, B. H. Meyer.	*Auburn, Nebr., G. D. Carrington.	New Athens, Ohio, Jos. Holmes.
State College, Agricultural Experimental Station.	La Grange, Jos. Cottam.	Friendship, J. M. Harrison.	Kimball, Nebr., D. Henderson, Jr.	Hepner, Oreg., Arthur Smith.
Tipton, Miss C. J. Wilson.	Lampasas, Dr. C. M. Ramsdell.	*Glasgow, Henry M. Crombie.	*Stuart, Nebr., C. E. Barber.	Port Royal, S. C., H. D. Elliott.
Troy, Rev. M. Gustin.	*Longview, G. W. Krech.	Grantsburgh, M. L. Roby, M. D.	*Clayton, N. Mex., H. E. Byler.	Dallas, Tex., C. F. Mercer.
Tuscarora, R. J. Micky.	*Luling, W. H. Rather.	Greenwood, H. J. Thomas.	Arcade, N. Y., H. W. Clough.	Duval, Tex., Jno. C. Edgar.
Wellsborough, Hiram D. Deming.	Merkel, J. L. Vaughan.	Hayward, J. M. Custard.	Rome, N. Y., Dr. H. C. Sutton.	Losee, Utah, Ephraim Cozall.
West Chester, Dr. Jesse C. Green.	Mesquite, Silas G. Lackey.	Lincoln, A. J. Loose.	Bealsville, Ohio, R. G. McGanghy.	Saint George, Utah, Seth A. Pym.
*Westtown, Wm. F. Wickersham.	New Braunfels, Paul Wipprecht.	Madison, Washburn Observatory.		Lexington, Va., Prof. H. D. Campbell.
RHODE ISLAND.	New Ulm, C. Runge.	Manitowoc, Miss Clasina Lüps.		Rowlesburg, W. Va., M. J. Cos
Kingston, C. O. Flagg.	Pecos City, C. H. Merriman.	Neillsville, W. Heaslett.		Lancaster, Wis., Edward Pollo
SOUTH CAROLINA.	Silver Falls, C. M. Tilford.	Oshkosh, Prof. W. N. Mumper.		Wausau, Wis., Hinemann Bros.
*Aiken, Dr. W. H. Geddings.	Snyder, A. C. Wilmeth.	Richland Centre, H. M. Ludwig.		Lusk, Wyo., F. S. Lusk.
Cedar Springs, J. T. Bayerly.	*Victoria, W. S. Schmidt.	Summit Lake, E. S. Koepenick.		Wheatland, Wyo., M. R. Johns
Columbia, S. C. Weather Service.	*Waco, W. H. Godber.	Viroqua, F. J. Bold.		Havanna, Cuba, Dr. Enrigue de Monte.
Kirkwood, Colin Macrae.	UTAH.	Waucousta, G. H. Yapp.		
Statesburgh, Dr. W. W. Anderson.	Levan, A. B. Larsen.	Weston, R. R. Wilkinson.		
	VERMONT.	FOREIGN.		
	Brattleborough, W. H. Childs.	*Burnside, S. A., Dr. C. J. Hering.		
	Burlington, W. B. Gates.	Grand Turk, West Indies, Geo. I. Gibbs.		
	Coventry, W. H. Tibbetts.			

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for June, 1889.

ALABAMA.
Mount Vernon Barracks.

ARIZONA.
Apache, Fort.
Bowie, Fort.
Huachuca, Fort.
Lowell, Fort.
McDowell, Fort.
Mojave, Fort.
San Carlos.
Verde, Fort.
Whipple Barracks.

ARKANSAS.
Hot Springs.
Little Rock Barracks.

CALIFORNIA.
Alcatras Island.
Angel Island.
Benicia Barracks.
Bidwell, Fort.
Gaston, Fort.
Mason, Fort.
Presidio of San Franc'sco.
San Diego Barracks.

COLORADO.
Crawford, Fort.
Lewis, Fort.
Logan, Fort.
Lyons, Fort.

CONNECTICUT.
Trumbull, Fort.

DAKOTA.
A. Lincoln, Fort.
Bennett, Fort.
Buford, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sully, Fort.
Totten, Fort.
Yates, Fort.

DISTRICT OF COLUMBIA.
Washington Barracks.

FLORIDA.
Barrancas, Fort.
Saint Francis Barracks.

IDAHO.
Boisé Barracks.
Sherman, Fort.

ILLINOIS.
Rock Island Arsenal.
Sheridan, Fort.

INDIAN TERRITORY.
Gibson, Fort.
Reno, Fort,
Sill, Fort.
Supply, Fort.

KANSAS.
Hays, Fort.
Leavenworth, Fort.
Leavenworth Prison.
Riley, Fort.

KENTUCKY.
Newport Barracks.

LOUISIANA.
Jackson Barracks.

MAINE.
Kennebec Arsenal.
Preble, Fort.

MARYLAND.
McHenry, Fort.

MASSACHUSETTS.
Springfield Armory.
Warren, Fort.

MICHIGAN.
Brady, Fort.
Mackinac, Fort.
Wayne, Fort.

MINNESOTA.
Snelling, Fort.

MISSOURI.
Jefferson Barracks.

MONTANA.
Assiniboine, Fort.
Custer, Fort.
Keogh, Fort.
Maginnis, Fort.
Missoula, Fort.
Poplar River, Fort.
Shaw, Fort.

NEBRASKA.
Niobrara, Fort.

NEBRASKA—Cont'd.
Omaha, Fort.
Robinson, Fort.
Sidney, Fort.

NEW MEXICO.
Bayard, Fort.
Marcy, Fort.
Selden, Fort.
Stanton, Fort.
Union, Fort.
Wingate, Fort.

NEW YORK.
Columbus, Fort.
David's Island.
Hamilton, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburgh Barracks.
Porter, Fort.
Schuyler, Fort.
Wadsworth, Fort.
Watervliet Arsenal.
West Point Mil. Acad'my.

NEW YORK—Cont'd.
Willett's Point.

OHIO.
Columbus Barracks.

OREGON.
Klamath, Fort.

PENNSYLVANIA.
Allegheny Arsenal.
Frankford Arsenal.

RHODE ISLAND.
Adams, Fort.

TEXAS.
Bliss, Fort.
Brown, Fort.
Clark, Fort.
Davis, Fort.
Eagle Pass, Camp.
Elliott, Fort.
Hancock, Fort.
McIntosh, Fort.
Peña Colorado, Camp.

TEXAS—Cont'd.
Ringgold, Fort.
San Antonio, Post at.

UTAH.
Du Chesne, Fort.
Douglas, Fort.

VIRGINIA.
Monroe, Fort.
Myer, Fort.

WASHINGTON TER.
Spokane, Fort.
Townsend, Fort.
Vancouver, Fort.
Walla Walla, Fort.

WYOMING.
Bridger, Fort.
D. A. Russell, Fort.
Laramie, Fort.
McKinney, Fort.
Pilot Butte, Camp.
Sheridan, Camp.
Washakie, Fort.